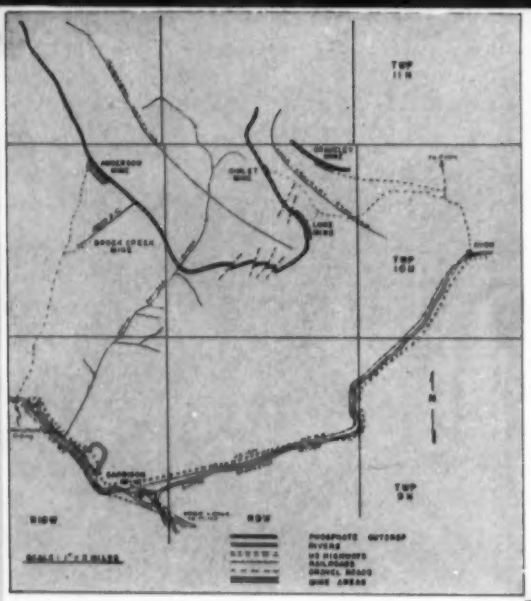
NOVEMBER 1955 VOL. 17, NO. 12

MINING WORLD



Montana Phosphate Starts Open Pit

Page 44

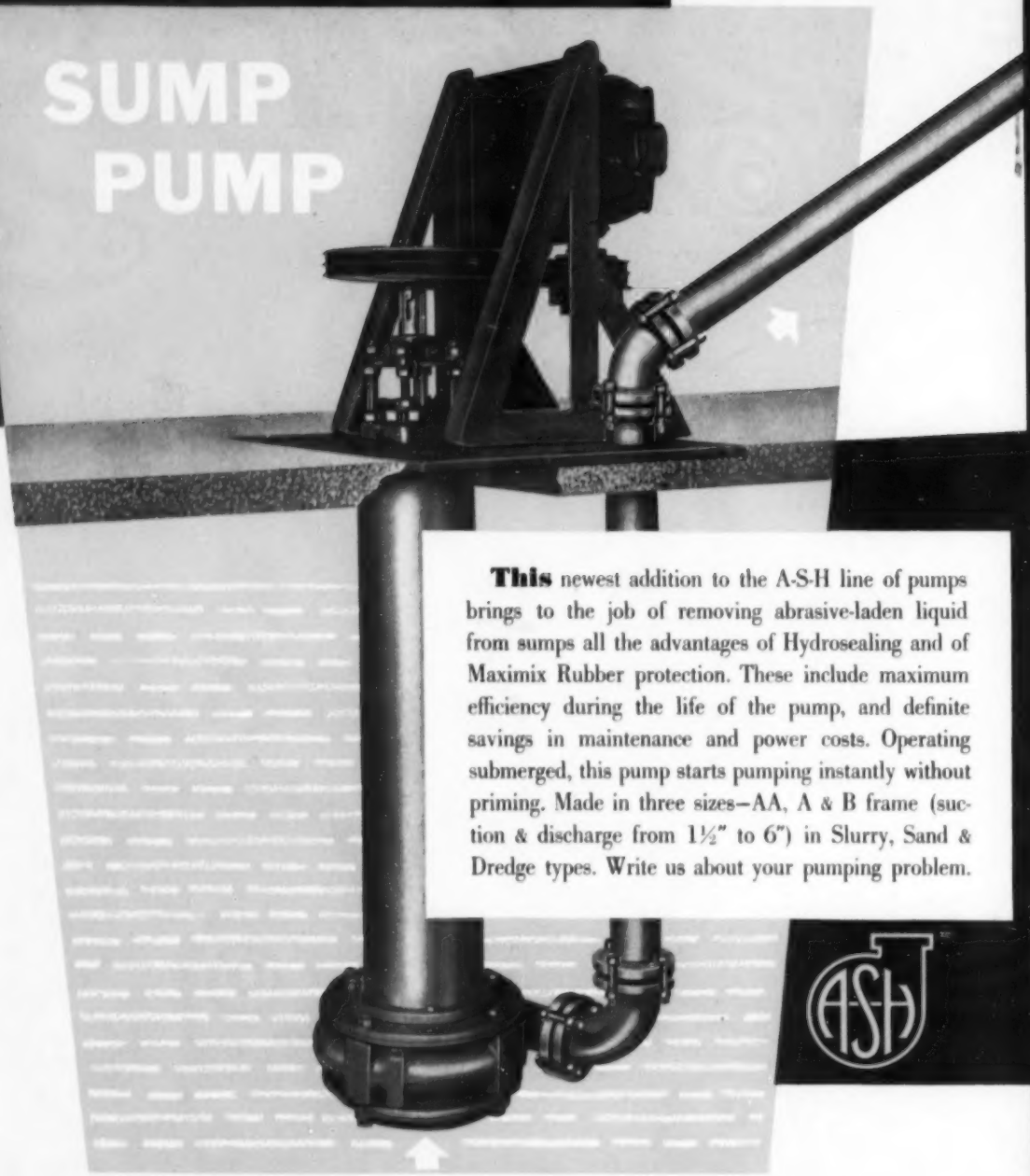
Sub Level Caving At Grängesberg

Page 50

50 cents a copy—3s 6d in sterling

NEW Hydroseal

SUMP PUMP



This newest addition to the A-S-H line of pumps brings to the job of removing abrasive-laden liquid from sumps all the advantages of Hydrosealing and of Maximix Rubber protection. These include maximum efficiency during the life of the pump, and definite savings in maintenance and power costs. Operating submerged, this pump starts pumping instantly without priming. Made in three sizes—AA, A & B frame (suction & discharge from 1½" to 6") in Slurry, Sand & Dredge types. Write us about your pumping problem.

HYDROSEAL
VERTICAL sump pump

... like HYDROSEAL and CENTRISEAL Slurry, Sand and Dredge Pumps

MAXIMIX RUBBER PROTECTED

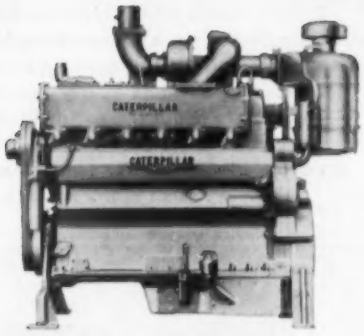
THE ALLEN-SHERMAN-HOFF PUMP CO.
Dept. J—259 E. Lancaster Ave., Wynnewood, Pa.
Representatives throughout the World

Announcing 2 more new

CAT* DIESEL ENGINES

THE NEW D337

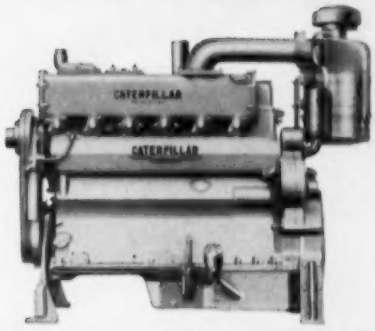
Series F with Turbocharger



310 HP maximum @ 2000 r.p.m.

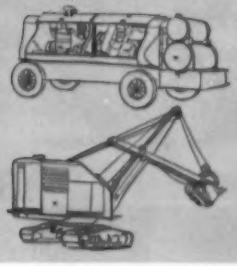
THE NEW D326

Series F



200 HP maximum @ 2000 r.p.m.

MODERN, COMPACT, HEAVY-DUTY UNITS FOR



Conveyors	Mining Equipment
Compressors	Electric Power
Cranes	Auxiliary
Excavators	Full time
Hoists	Portable
Locomotives	Pumping

Rock Crushers

Available as original power in many types of equipment . . . direct drive or choice of transmissions, including hydraulic couplings and torque converters. Also available as Electric Sets and Marine Engines.

CHOICE OF 3 STARTING SYSTEMS

AIR—For fast starts where a supply of compressed air is on hand. Also available: air compressors and storage equipment.

ELECTRIC—Where speed of starting and convenience are important. Also available: automatic start-stop controls which require no operating personnel.

GASOLINE—For all-weather starting. Preconditions the diesel and lubricates before the diesel is started. Also available: electric starters for the gasoline starting engine.

Here are the two newest diesels in the Caterpillar line. They offer you more for your money than *any* engines in their power range. Combining major advances in design with time-tested Caterpillar features, they're built to deliver more power with less maintenance and lower cost. For example:

• New Turbocharger (in the D337 Series F) utilizes exhaust heat to drive supercharger. Delivers air in direct proportion to engine's need. • New hydraulic valve lifters practically eliminate valve adjustment, provide quiet operation. • New, improved water jets for more effective cooling. • Heavy-duty, oil-cooled pistons with chrome-faced rings for longer life. • Sealed cooling system reduces mineral deposits. • Full-flow filtering of fuel and lube oils. • Complete line of attachments to meet all your requirements.

All these and other features add up to a new standard of performance. For details, see your Caterpillar Dealer. You can always count on him for reliable information and prompt service!

Caterpillar Tractor Co., San Leandro, Cal.; Peoria, Ill., U.S.A.

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

NEW D337 Series F
and NEW D326 Series F—
LATEST EXAMPLES OF CATERPILLAR
LEADERSHIP IN ACTION

MAIL TODAY

CATERPILLAR TRACTOR CO., PEORIA, ILL., U. S. A.

I'd like more information on the new D337 Series F ☐, D326 Series F ☐.

Name_____

Address_____

City_____ Zone_____ State_____

High Production and Lower Maintenance–

You Get BOTH with "Eucs"

Built for tough off-the-highway service, Rear-Dump Euclids have increased production and reduced hauling costs on scores of open pit mining and quarry operations. Ability to deliver "plus" performance year in and year out has made "Eucs" the accepted standard for comparison . . . here are some of the reasons why:

RUGGED SIMPLICITY

Designed and built for long life and low maintenance cost. All of Euclid's experience and facilities are devoted to specialized off-the-highway earth moving equipment.

CAPACITY

Euclids have payload capacities of 10, 15, 22, 34 and 50 tons. Because they are matched to various sizes of loading and crushing equipment, "Eucs" provide a well balanced operation for open pit haulage and increase the efficiency of the loading unit.

POWER AND SPEED

Powered by diesel engines of 125 to 600 h.p. "Eucs" have top speeds with full payload, up to 36 m.p.h. Five and ten speed transmission, or torque converter with semi-automatic transmission available. The favorable ratio of horsepower to payload means more pay tons hauled every trip.

VERSATILITY

"Eucs" are efficient for moving any material on any length of haul; handle overburden, rock, coal, ore and other materials loaded by shovels, draglines, transfer hoppers and mobile loading equipment.

If you are interested in higher production at lower cost, have your nearby Euclid Distributor show you what "Eucs" are doing on work similar to yours. He'll be glad to make a hauling cost estimate for your job—no obligation, of course.

EUCLID DIVISION
GENERAL MOTORS CORPORATION,
CLEVELAND 17, OHIO

Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE

GM GENERAL MOTORS

Mining World

Including the Export Edition **WORLD MINING**

Published monthly except in April when publication is semi-monthly

VOLUME 17 **NOVEMBER 1955** No. 12

MINING WORLD	Page
Drifts and Crosscuts	39
Capitol Concentrates	41
U. S. Personalities in the News	61
Index of Advertisers	98
WORLD MINING	
International Panorama	43
Montana Phosphate Starts Open Pit To Mine Thin Ore Bed	44
How Humphreys Separates Titanium Minerals at New Highland Plant	47
How Grangesberg Uses Mechanical Sub-Level Caving of Hard Iron Ore by Bror-Knut Lundin	50
First Taconite Milled at Reserve's Davis Works	55
Development of New Borax Mine Rushed in Southern California	57
Newsmakers in International Mining	63
Money Making Methods	65
Fission Facts	67
International News	68
Production Equipment Preview	78

PUBLISHING OFFICE
Emmett St., Bristol, Conn.

EDITORIAL AND EXECUTIVE OFFICES
121 Second St., San Francisco 5, Calif., GArfield 1-5887

General Manager, San Francisco — M. F. Holsinger
Editor — George O. Argall, Jr.
Associate Editor — Stanley Dayton
News Editor — Janet M. Taylor
Assistant News Editor — J. Wolfe
Product Editor — B. A. McCurry
Production Manager — J. A. Cheesman
Mgr., Eng. Services — H. G. Grundstedt
Dist. Mgr., New York — A. E. Roberts
Dist. Mgr., Chicago — R. N. Crosby
Assoc. Ed., Van. — Charles L. Shaw

BRANCH OFFICES

New York 17—370 Lexington Ave., Murray Hill 3-9295. Chicago 26—1791 Howard, Rogers Park 4-5450. Vancouver, B.C.—402 Pender St. West, MAriae 7257.

PUBLISHED BY
American Trade Journals, Inc.
Wm. B. Freeman, President — L. K. Smith, Vice President
Miller Freeman, Jr., Sec.-Treas.

STAFF CORRESPONDENTS

Africa: Accra, Gold Coast; Costermansville, Belgian Congo; Johannesburg, Union of South Africa and Kitwe, Northern Rhodesia. Asia: Ankara, Turkey; Benares, India; Kuala Lumpur, Federated Malay States; and Tokyo, Japan. Europe: Frankfurt, West Germany; Helsinki, Finland; London, England; Madrid, Spain; Vienna, Austria; Paris, France; Redruth, Cornwall; Rome, Italy; Stockholm, Sweden; The Hague, Netherlands; and Trondheim, Norway. North and Central America: Mexico City, Mexico; San Jose, Costa Rica; and Vancouver, British Columbia. Oceania: Port Kembla, (N.S.W.) Australia. South America: Bernal, Argentina; La Paz, Bolivia; Lima, Peru; and Sao Paulo, Brazil.

Not responsible for unsolicited manuscripts.

Copyright 1955 by American Trade Journals, Inc.

Contents may not be reproduced without permission

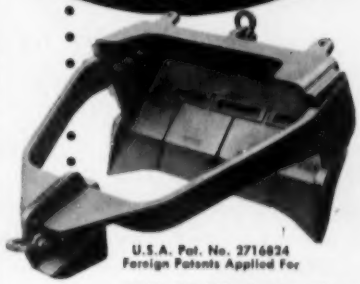
Mining World Subscription Rates

U. S. North, South and Central America	$3.00
Other Countries	$4.00
Single Copies	$ .50
Directory Number	$1.00

WORLD MINING is published the 20th of each month as a regular department of MINING WORLD and is also circulated as a separate publication on a carefully controlled free basis to a selected list of management and supervisory personnel associated with active mining enterprises throughout the world.

MILLER FREEMAN PUBLICATIONS

Pacific "SLUSHMASTER" SCRAPERS Move More Muck at less cost



U.S.A. Pat. No. 2716824
Foreign Patents Applied For

1. Pacific "Slushmasters" are standard equipment with many leading mining companies.
2. They stand up under the toughest service.
3. They help you move more muck at less cost.
4. Our very best advertising is provided by satisfied customers. Write us for names of those in your area.

TEN SIZES

MODEL	SIZE	WEIGHT
2A	26"	398#
2A	30"	485#
2A	34"	515#
AB	36"	744#
AB	42"	812#
AB	48"	951#
2B	36"	1280#
2B	42"	1395#
2B	48"	1520#
2C	60"	2360#

Let us send you copies of New Bulletins No. 253 and No. 254 which give specifications and operating features of Pacific "Slushmaster" Scrapers; also name of representative in your area.

Use Pacific Sheave Blocks, Sheave Anchors, "Round-The-Corner" Sheave Blocks, Jaw Crushers, Bit Knockers and Pacific Wearing Parts.

A
ALLOY STEEL & METALS CO.
1848 E. 55th St., Los Angeles 58, Calif.
Mailing Address: Box 58323 Vernon Sta.
Los Angeles 58, Calif.

MINING WORLD, November, 1955. Volume 17, No. 12. Published monthly, except April, when publication is semi-monthly at Emmett St., Bristol, Conn. Executive, advertising and editorial offices, 121 Second St., San Francisco 5, California. Subscription in United States, North, Central, and South America, $3.00 per year; other countries, $4.00 per year. Entered as second class matter Oct. 10, 1951 at the Post Office at Bristol, Conn., under the act of March 3, 1879. Postmaster: please send notice 3579 to MINING WORLD, 121 Second St., San Francisco 5, Calif.

Your electrode clamps are the key to

LOWER OPERATING COSTS

Lectromelt offers you dependability, resistance to corrosion and high temperatures*

START a smelting furnace to work and there's no shutting down for making replacements. Every piece of equipment has to stay on the job until you make a complete shut-down. This is especially tough on electrode holders, since they're located where temperatures are highest and corrosive conditions worst.

You can make the electrode holders the strongest point in your furnace set-up by choosing Lectromelt equipment. Special care has been given to their design and plenty of metal goes into each unit. Clamps, supports and operating mechanisms are built generously to assure long life and low upkeep.

So many improvements have been made in clamps in recent years that many obsolete clamps are now being replaced with Lectromelt equipment.

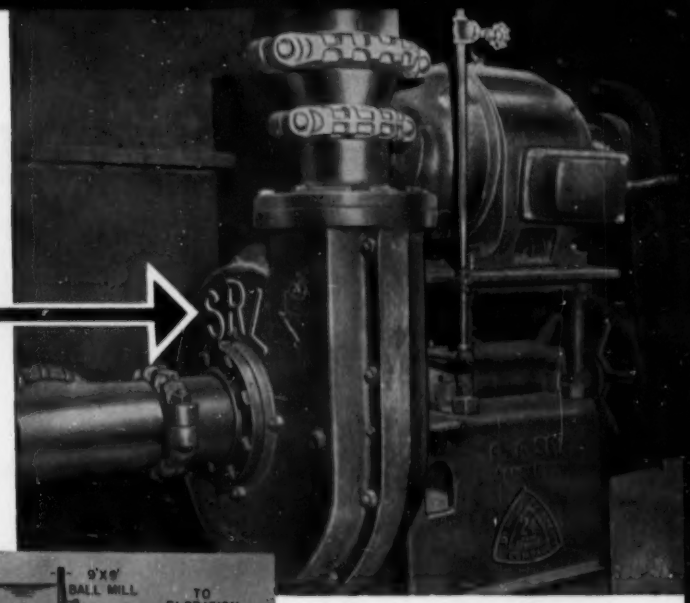
Lectromelt engineers are expert on electrothermic problems. Our men have been dealing in problems of smelting and refining with electric-arc furnaces for many years. For this help, and for a free copy of Catalog No. 105 describing Lectromelt Furnaces, write Pittsburgh Lectromelt Furnace Corporation, 324 32nd Street, Pittsburgh 30, Pennsylvania.

Manufactured in... GERMANY: Friedrich Kocks GMBH, Dusseldorf... ENGLAND: Birlec, Ltd., Birmingham ... FRANCE: Stein et Roubaix, Paris... BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege ... SPAIN: General Electrica Espanola, Bilbao ... ITALY: Forni Stein, Genoa. JAPAN: Daido Steel Co., Ltd., Nagoya

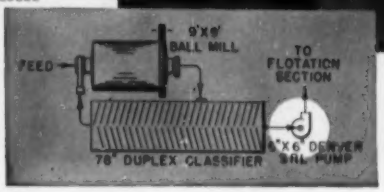
*REG. U. S. PAT. OFF.

WHEN YOU MELT... MOORE RAPID *Lectromelt*

DENVER SRL PUMPS AT Climax



Here's why Climax Molybdenum Company has 44 Denver SRL Sand Pumps in it's modern, efficient mill



A 6"x6" Denver SRL Sand Pump operating at 690 r.p.m., handling 2200 tons per 24 hours of —28 mesh classifier overflow material at 45% solids. Life of pump runner and casing liner was 593,000 tons.

BACKGROUND

Originally, a 2"x2" Denver SRL (Rubber Lined) Sand Pump was installed on a trial basis at Climax to handle coarse, abrasive —28 mesh deslimed pyrite flotation concentrates. Later, Climax purchased one 6"x6" Denver SRL Pump to handle the problem described with the photo above.

RESULT

Operation of these original Denver SRL pumps was so successful that, as a direct result, 42 additional Denver SRL Sand Pumps have been installed in this outstanding mill. These new pumps vary in size from the 2"x2" SRL (Open Runner) to the 8"x6" SRL-C (Closed Runner).

REASON

The Climax operators have found the efficient, trouble-free operation of Denver SRL Pumps entirely satisfactory. Life of wearing parts is long and shut-down time minimized. Horsepower requirements have been low and high efficiencies have resulted. Obviously, the Denver SRL is a big success at Climax.

HOW DENVER SRL PUMPS CAN REDUCE YOUR PUMPING COSTS

Send full data to us today regarding your particular pumping problem. Experienced DECO engineers will evaluate your problem and will return correct and workable recommendations immediately. This will obligate you in no way.

We carry replacement parts for all sizes of Denver SRL Sand Pumps in our Denver stocks. This enables us to give you prompt service whenever you may need it.

WRITE FOR FREE BULLETIN

DECO FLOTATION ENGINEERS — DENVER EQUIPMENT COMPANY 24 HOUR SERVICE

"The firm that makes its friends happier, healthier and wealthier"

DENVER, NEW YORK, CHICAGO, EL PASO, SALT LAKE CITY, VANCOUVER, TORONTO, MEXICO, D.F., LONDON, JOHANNESBURG

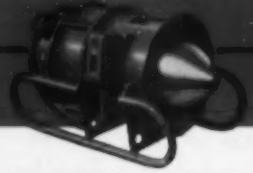
DENVER EQUIPMENT CO., 1400 Seventeenth St., Denver 17, Colorado

A JEFFREY FAN FOR EVERY MINE JOB . . .

for heavy duty up to 13" W.G. pressure

This western mine installation is the 12A Series AERODYNE — a 12-blade, self-contained deluxe fan designed for maximum pressure of 13" W.G. and volumes from 20,000 to 700,000 C.F.M. Features include individual, positive blade adjustment and custom-made pillow block which has internal circulating oil lubrication, with ample radial loaded spherical roller bearings and separate end thrust ball bearing. For heavy duty, Jeffrey also builds the most popular mine fan in America, the 8H Series AERODYNE. The 8H can blow or exhaust from 20,000 to 500,000 C.F.M. of air at pressure up to 20" W.G.

for ventilating single drifts



for medium duty up to 5" W.G. pressure

Economy and efficiency are combined in the Jeffrey 6F Series AERODYNE engineered for medium duty general mine ventilation. Six universally adjustable blades made of cast-aluminum alloy give the 6F wide adaptation to changing conditions. Another low cost fan for intermediate duty is the Jeffrey AERODYNE Jr., with capacity of 5,000 to 150,000 C.F.M. up to 4" W.G. pressure.

In exploration mining no fan beats the Jeffrey 5 H.P. AERODYNE Midget for blowing or exhaust through tubing. This sturdy, self-contained fan has free delivery volume of 6200 C.F.M., 6.5" Maximum Static Pressure. It's a low-height, light-weight unit, easily portable from place to place. Also for light duty ventilation: Jeffrey 1½ H.P. Midget Blowers, Type 61 Blowers and Universal Blowers.

Write Mining Sales Division for more information

THE JEFFREY MANUFACTURING CO.

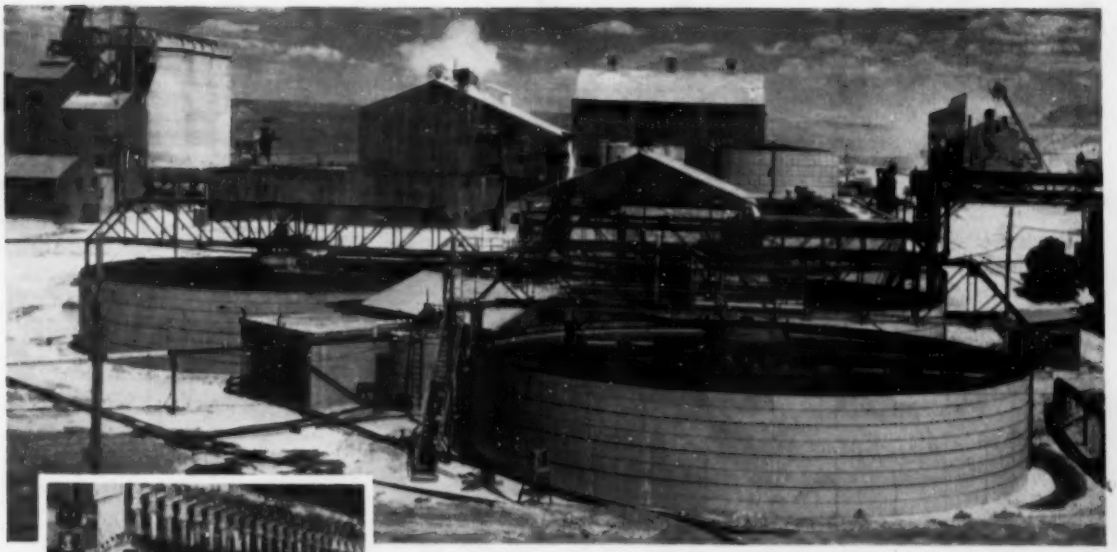
ESTABLISHED 1877

Columbus 16, Ohio

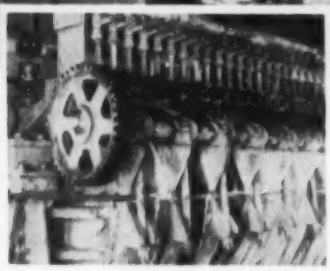
sales offices and distributors in principal cities

PLANTS IN CANADA, ENGLAND, SOUTH AFRICA

IF IT'S MINED, PROCESSED OR MOVED . . . IT'S A JOB FOR JEFFREY!



General view of plant with three Dorr Thickeners in foreground.



Closeup of one of the six Sweetland Filters.

Dorr-Oliver Techniques

at INTERMOUNTAIN CHEMICAL COMPANY

(OPERATED BY WESTVACO CHLOR-ALKALI DIVISION, FOOD MACHINERY & CHEMICAL CORPORATION)

The vast trona deposits throughout the Green River, Wyoming, area represent an assured supply of soda ash for expanding western industry. But before calcination, insolubles amounting to approximately 10% must be removed by physical means. And here Dorr-Oliver equipment and methods play a vital role.

At Intermountain Chemical Company's Green River Processing Plant, trona ore is crushed, screened and dissolved in mother liquor and a small amount of makeup water. Solution is then clarified in two 80′ dia. Dorr Thickeners. Underflows are washed free of entrained salt in a third Dorr Thickener. Combined overflow from the three Thickeners is a sodium sesqui-carbonate solution which is polished on six #12 Sweetland Filters. The Sweetlands are of cast iron construction with 72 leaves each providing a total filter area of 6024 square feet. After polishing, the solution is concentrated in triple effect vacuum crystallizers. The resulting crystals are thickened in two 30′ dia. Dorr Units and are then calcined to soda ash. Operated by Westvaco Chlor-Alkali Division of Food Machinery and Chemical Corporation, the plant has a capacity of 350,000 tons per year.

For the Process Industries, Dorr-Oliver offers a complete and integrated service. Well-designed equipment, as installed at Intermountain Chemical, is an important part of this service. But if your processing needs involve laboratory and pilot plant testing, flowsheet preparation, economic analysis or complete plant design and construction, we can also be of help. For a complete picture of the scope of the Dorr-Oliver technical service write for a copy of Bulletin No. 7003. Dorr-Oliver Inc., Stamford, Connecticut.

Sweetland — T.M. Reg. U. S. Patent Office

DORR-OLIVER
INCORPORATED
WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT
STAMFORD • CONNECTICUT • U.S.A.

A report from a Canadian gypsum Company

on their 6 new high-speed haulers and tractors

Wide bowl opening on Rear-Dump provides easy target for dragline loading. Model shown has 19-ton capacity . . . newest "C's" carry 22 tons.

Smooth, streamlined, unobstructed body readily sheds sticky material.

Haul to overburden dump is made at speeds up to 35 mph.

High-speed mining tools by LeTourneau-Westinghouse

REAR-DUMPS

9 ton, 138 hp
22 ton, 208 hp
35 ton, 293 hp
50 ton, 420 hp

BOTTOM-DUMPS

18 yard, 208 hp

SELF-PROPELLED SCRAPERS

7 yard, 138 hp
16 yard, 208 hp
23 yard, 293 hp

Rear-Dumps, Bottom-Dumps and Scrapers all interchangeable behind same prime-mover.

RUBBER-TIRED TRACTORS

Now available—208 hp

A leading Canadian gypsum Company must take all their gypsum from under a 30 to 75 ft. layer of clay-pocketed rock. This sticky overburden is loaded by draglines, and hauled half a mile to waste dumps. Six LeTourneau-Westinghouse units are used to speed hauling and dozing on the big job. Here is what they report about these machines.

Advantages of Tournapulls

Two original Tournapull Rear-Dumps were purchased to haul overburden following years of satisfactory experience with bottom-dump Tournatrailers. These two 18-ton rear-dumps performed so well, the company recently bought 2 more.

1 Company officials give, as chief advantage, the ability of the Tournapull Rear-Dumps to go through mud which stops all other haulers. Tournapulls even work out of deep mud-holes and off dumps so soft a man cannot walk through them. This exceptional mud-ability is due partly to traction of big single 21.00 x 25 low-pressure tires . . . partly to power steer which works independently of footing through geared kingpin . . . partly to exclusive patented differential which *automatically* transfers power from slipping wheel to wheel on better footing.

2 Tournapull Rear-Dumps haul faster than ordinary trucks on the rough roads. Rig's big tires cushion the bumps, let Tournapulls often reach top speeds.

3 Tournapull Rear-Dumps work faster in narrow quarters. They turn around normally in a space 24 ft. wide . . . with bowl raised (which shortens wheelbase) they turn around non-stop in a space only 21 ft. wide. This mobility

A Subsidiary of Westinghouse Air Brake Company

speeds haul on narrow roads, reduces time for spotting turn at both shovel and dump.

4 Tournapull Rear-Dumps need practically no clean-up aid on the dump. With front-wheel drive, they back safely to edge of bank. Bowl swings behind and below rear wheels . . . loads fall free over the edge. Company officials say only one clean-up is now needed *per day*.

Advantages of Tournatractors

Company owns two of these big 4-wheel tractors. Each is equipped with dozer blade, does such work as leveling tailings pile, cleaning overburden dump, maintaining stockpiles, plowing snow.

1 Canadian gypsum officials say Tournatractors chief advantage is their ability to go anywhere . . . over rough ground, pavement, railroad tracks. Tires do no damage to surface, or surface to tires. Mobility pays off especially on such scattered jobs as removing newly-shot rock from rail tracks. Fast removal is important here, since gypsum is carried to crushers and screening plant by railroad ore cars.

2 Speed often enables each Tournatractor to do as much work as 2 crawler-tractors. Tournatractors doze faster, 3 to 8 mph, compared to crawlers' 1 to 4 mph . . . they back up faster, 3 to 8 mph vs. crawlers' 1 to 3 mph . . . they move faster between jobs, 19 mph vs. 4 to 8 mph for track machines.

3 Tournatractors reduce maintenance needs. Because 4 rubber-tired wheels do work of the 500 to 600 parts of a track assembly, there are less places to grease and oil, fewer parts to wear out.

Ask us to show you first-hand how these advantages can pay off for you.

Tournapull, Tournatractor—Trademark Reg. U.S. Pat. Off. TR-750-M

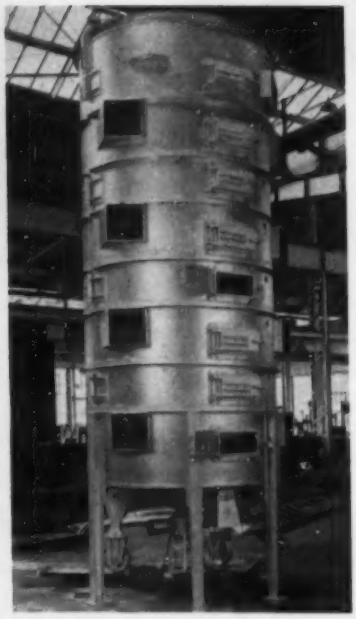
LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

Tournatractor low-pressure tires provide plenty of flotation and traction in loose steep-grade footing. Multi-disc 4-wheel air brakes give ample margin of safety.

Dozing rock, Tournatractor moves up to 2½ cubic yards per pass.

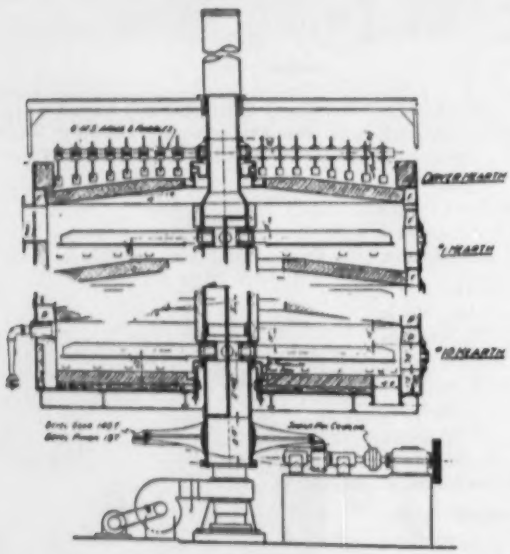
SKINNER
Multiple Hearth Roasters and Dryers



Proved in the Field for 37 Years...
...on many applications

Skinner Roasters, manufactured by Colorado Iron Works, have been used for efficient roasting and drying of ores, clays, limestone, lime-sludge; decomposing oil sludge in the process of recovering sulphuric acid. These applications include sulphide roasting; oxidizing, reducing and chloridizing roasts.

Skinner Roasters have been used from the beginning in the Uranium-Vanadium industry. In the case of asphaltic ores the roasters burn off the undesirable carbon. On non-asphaltic ores roasting facilitates extraction and has become standard practice for removal of the vanadium content through salt-roasting.



MECHANICAL FEATURES

Skinner Roasters consist of a series of superimposed hearths over which the material is rabbled by rotating arms and easily replaceable teeth. The rabble arms are fastened to the central shaft by means of the distinctive Skinner bayonet lock. The shaft is constructed to allow for ample cooling of both shaft and arms from a blower or by natural draft. Among the distinctive advantages of CIW Skinner Roasters are: small diameter rugged center shaft increases net hearth area and volume; simple vertical adjustment of central shaft; quick replacement of rabble arms and teeth without cooling; up or down-draft and multiple hearth gas off-takes permit wide range of control; negligible dust losses. Coal, oil or gas fired. Sizes 2 to 12 hearths; 4'-0" to 23'-6" inside diameter.

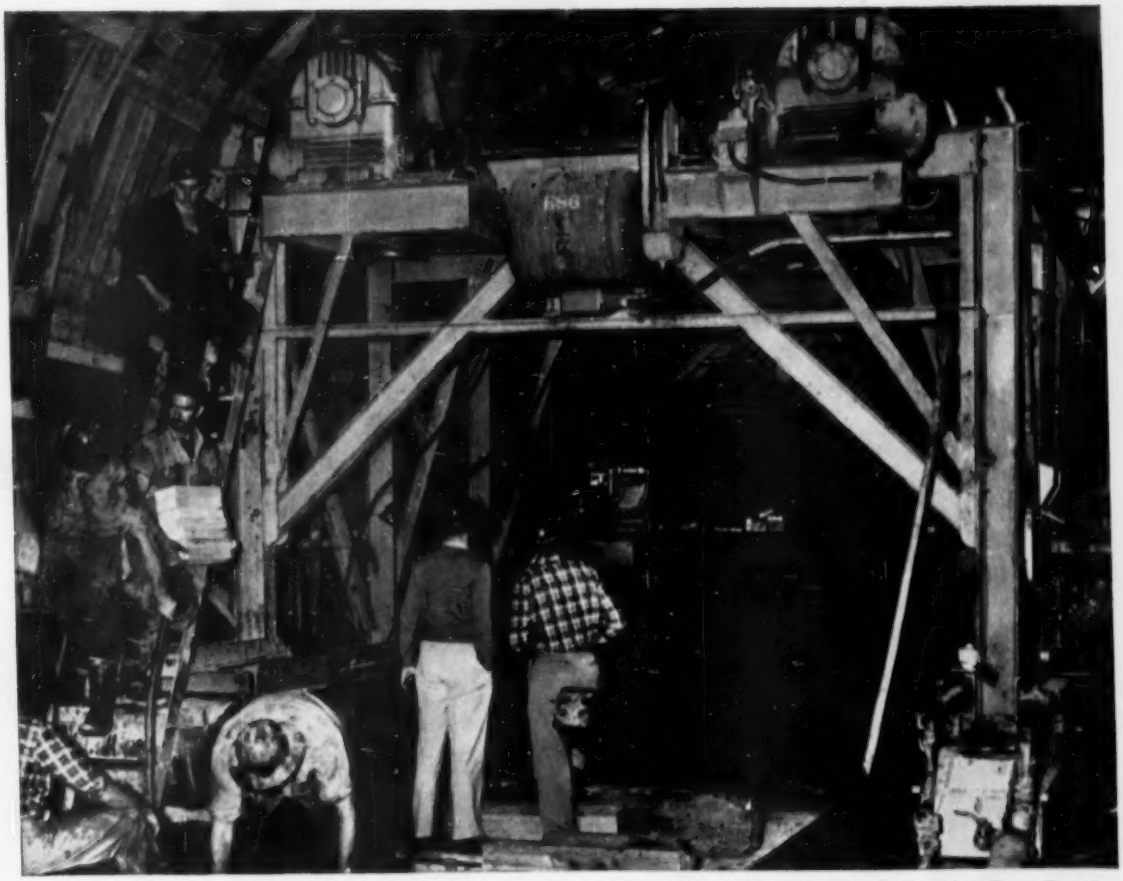
COLORADO IRON WORKS CO.

1624 17th Street • Denver 2, Colorado

AKINS CLASSIFIERS • SKINNER ROASTERS • LOWDEN DRYERS

Sales Agents and Licensed Manufacturers in Foreign Countries

A SUBSIDIARY OF THE MINE & SMELTER SUPPLY CO.



Gardner-Denver CP93 Drifters, on Gardner-Denver Hydraulic Booms, at work in the Eucumbene-Tumut Tunnel

One of the many important tunnels driven by Gardner-Denver drills...exclusively!

Project: The Eucumbene-Tumut Tunnel Project for the Snowy Mountain Hydro Electric Authority of Australia.

Contractors: Kaiser-Walsh-Perini-Raymond.

Tunnel Data: The longest tunnel ever worked on a single heading—24 x 24 feet. A record performance of tunnel advancement of 402 ft. in 6 working days.

Gardner-Denver Equipment on the Job: 12 Gardner-Denver CP93 Drifters mounted on 4' Slides. All machines mounted on Gardner-Denver Hydraulic Booms.

Find out why Gardner-Denver equipment has been first choice for more than 600,000 feet of major tunnel drilling throughout the world in the last five years alone.

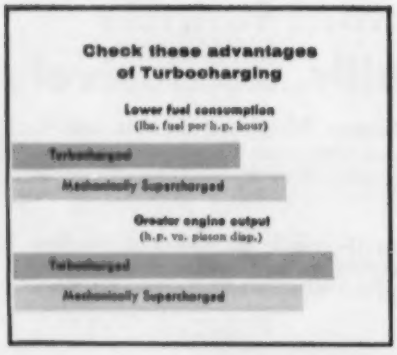
GARDNER-DENVER

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

Gardner-Denver Company, Quincy, Illinois

Export Division: 233 Broadway, New York 7, N. Y., U.S.A.

Cummins Turbodiesels •



Five new Cummins Turbodiesels (175 . . . 250 . . . 262 . . . 300 . . . and 600 h.p.) now feature the sensational new development—exhaust gas turbocharging of high-speed diesels.

They give you more economy . . . better performance than naturally aspirated or mechanically supercharged engines. Exhaust gas energy normally wasted is harnessed to achieve a more perfect air-fuel mixture in the combustion chamber, without any parasitic load. (See diagram at right.)

If you want reduced fuel costs . . . longer engine life . . . lowest possible weight per horsepower . . . and maximum profits . . . get full details on Cummins Turbodiesels from your nearest Cummins Distributor.

Cummins Arizona Diesel, Inc.

Phoenix	1350 No. 22nd Ave.	ALpine 8-2668

Cummins Intermountain Diesel Sales Company

Salt Lake City	1030 Gale St.	22-5823

Cummins Diesel Sales of Colorado, Inc.

Denver	2450 Curtis St.	Acoma 2-5933

Watson & Meehan

San Francisco	1960 Folsom St.	Market 1-8930
Fresno	248 Palm Ave.	4-3096
Redding	1127 Parkview Ave.	2840

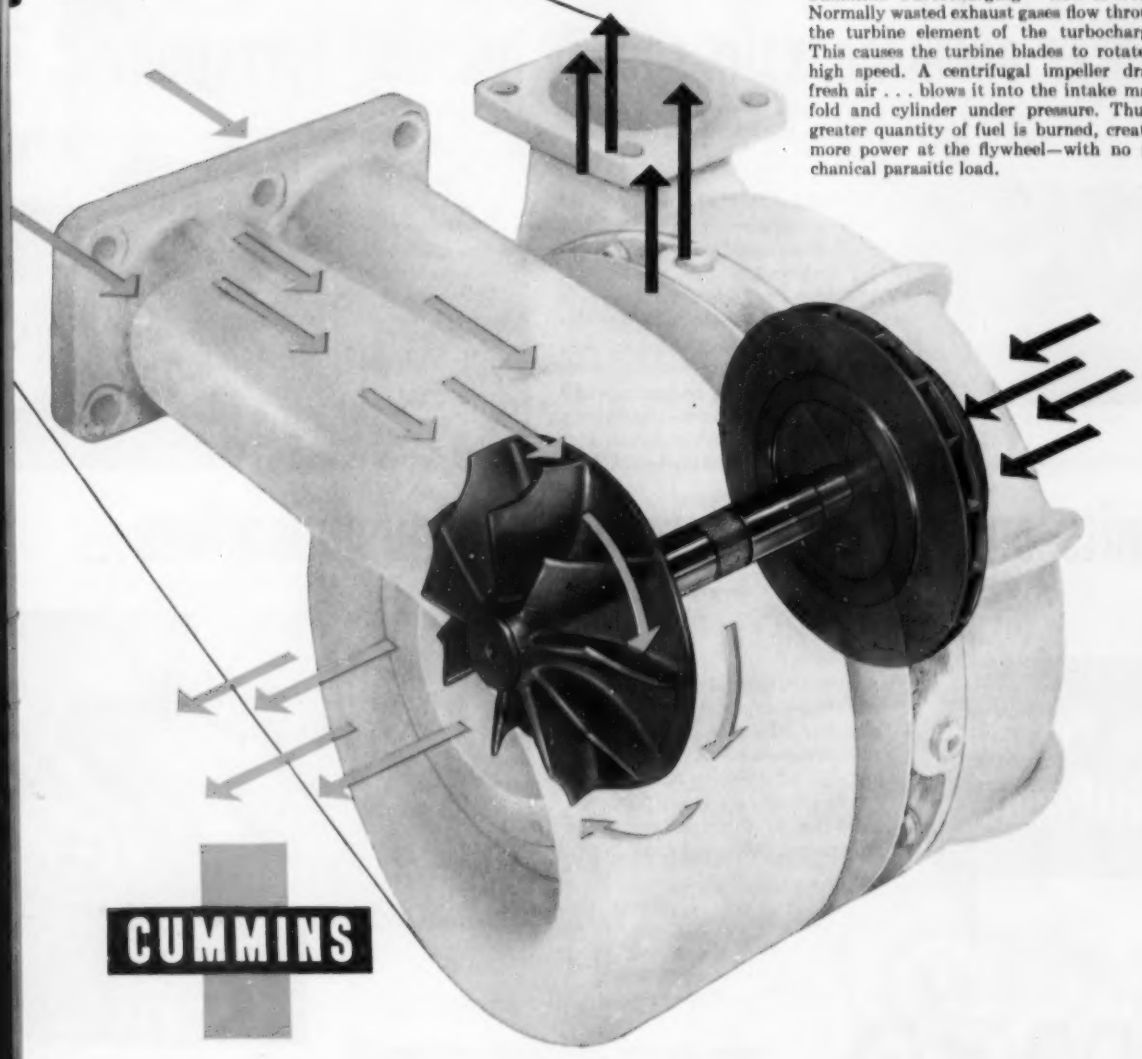
Cummins Diesel Sales Corporation

Hibbing	Hwy. 169 W., Box 159	3-7558
Duluth	2319 W. First St.	Randolph 7-6851
Iron Mountain	723 River Ave.	502

Authorized distributors for Cummins Engine Company, Inc., Columbus, Indiana

4-8-58

. . put waste heat to work!



Cummins Turbocharging — how it works. Normally wasted exhaust gases flow through the turbine element of the turbocharger. This causes the turbine blades to rotate at high speed. A centrifugal impeller draws fresh air . . . blows it into the intake manifold and cylinder under pressure. Thus a greater quantity of fuel is burned, creating more power at the flywheel—with no mechanical parasitic load.

CUMMINS

Boosts haulage efficiency and increases safety...

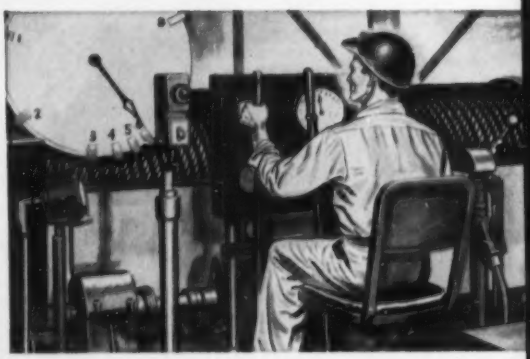
M·S·A MinePhone

The M.S.A. MinePhone is eliminating communication delays in mines everywhere. This clear, instant two-way voice communication system coordinates the wide variety of operations vital to peak production. Haulage moves faster because dispatcher and motormen are constantly in touch, even while trips are in motion. Shop and maintenance personnel are always "on call." And because messages are relayed instantly, on an open-line hookup, underground safety is increased. Write for details.

Assures accurate, safe, speedy hoisting operations...

M·S·A HoistPhone

The M.S.A. HoistPhone provides continuous, dependable and efficient voice communication between hoisting engineer and cage, at any level, and when in motion. The system is invaluable in emergencies, yet designed for day-in-day-out service. Ideal for passenger travel, load leveling, inspection trips, and construction work, the HoistPhone requires no special training; utilizes existing wiring. Write for complete details.



Permits emergency or temporary communications...

M·S·A Portable HoistPhone

A compact, integral unit that can be set up anywhere, and put into immediate service for clear, dependable voice communications. Its light weight and ease of operation make it ideal for temporary communications for inspection work or for emergency assignments. Write for details.

MSA
SAFETY EQUIPMENT HEADQUARTERS

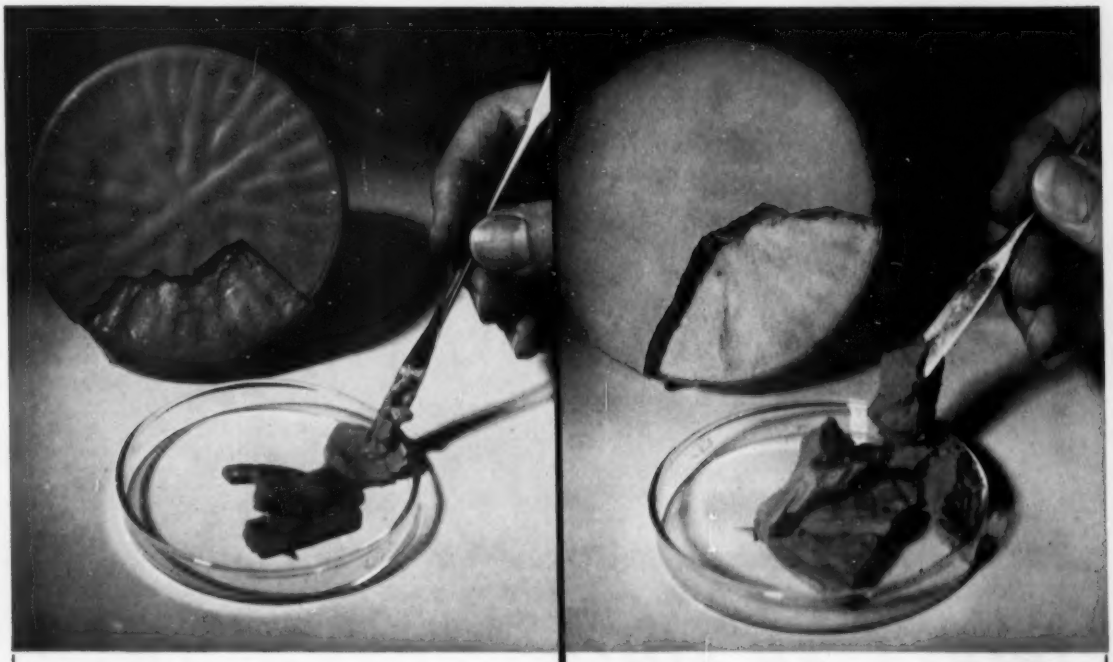
When you have a safety problem, M.S.A. is at your service. Our job is to help you.

MINE SAFETY APPLIANCES COMPANY
201 North Braddock Avenue, Pittsburgh 8, Pa.
At Your Service: 77 branch offices in the United States and Mexico

MINE SAFETY APPLIANCES CO. OF CANADA, LTD.
Toronto, Montreal, Calgary, Edmonton, Winnipeg, Vancouver, Sydney, N.S.

Separan 2610

GREATLY IMPROVES FILTRATION



Above picture shows thin cake formed on filter with untreated solids. Cycle includes 15-second cake formation and 45-second drying time.

During the same cycle, a much thicker cake is formed by treating with 0.15 lb. of SEPARAN 2610 per ton of dry solids present.

New flocculating agent speeds up filtration and settling rates, brings many other improvements to liquid-solid separations

THE DOW CHEMICAL COMPANY
Dept. TS-789D-2, Midland, Michigan

Please send me information and a trial sample of SEPARAN 2610.

Name_____

Company_____

Address_____

City_____ **State**_____

Prove to yourself the advantages of Separan* 2610 in filtration.

1. Increased cake size
2. Decreased cake moisture and better washability
3. Easy to handle and less dusty cake
4. Less material loss in filtrate
5. Effective over wide pH range

Prove to yourself the advantages of Separan 2610 in settling.

1. Up to 40 times faster settling rate
2. Increased overhead clarity
3. Less materials loss in overhead
4. Reduced cost in acid and alkaline media
5. Increased plant capacity

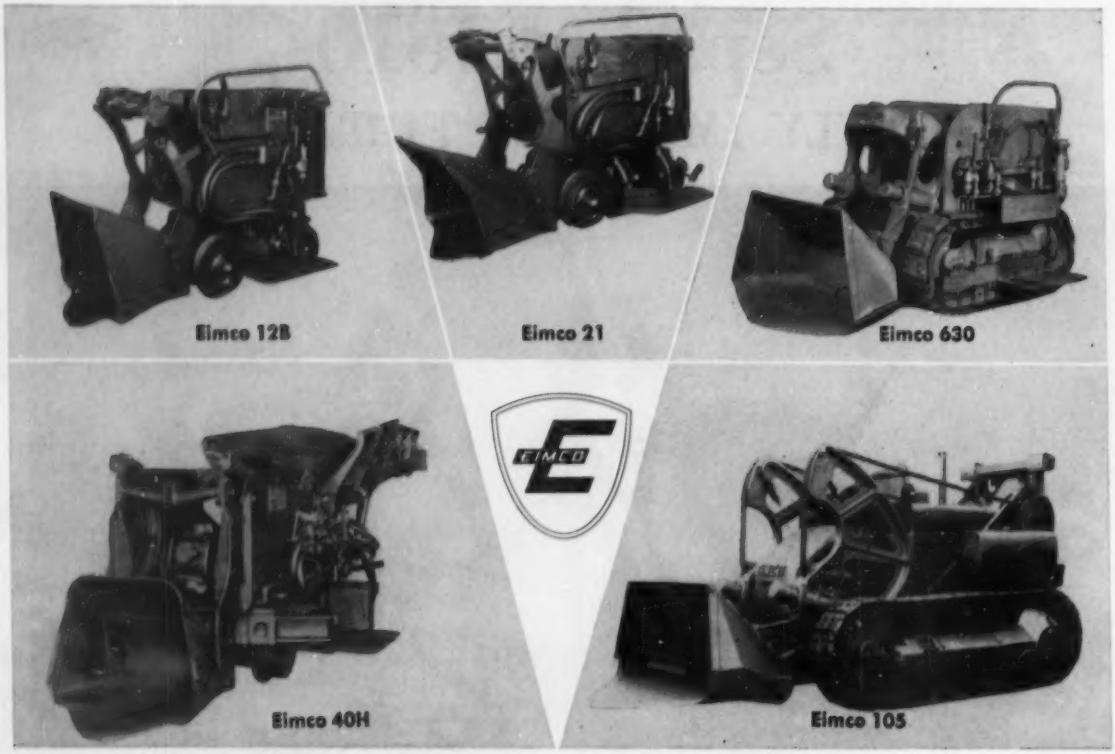
SEPARAN 2610 is highly effective in these industries:

- Uranium
- Clay
- Borax
- Cement
- Alum
- Potash
- Foundry Sand
- Coal
- Phosphoric Acid
- Iron Ore and Taconite
- Industrial Water, and Waste
- Miscellaneous Metals

*Trademark of The Dow Chemical Company

you can depend on DOW CHEMICALS

DOW



THERE'S AN EIMCO TO FIT YOUR LOADING JOB

There is an Eimco loader for your loading job. Small or large tunnels, drifts, slopes, inclines, haulage ways, overburden, cleanup, road building, clearing slides or any loading job that requires speed, economy and continuous operation with minimum machine attention.

Eimco loaders are available with wheels for rail type operation and crawler mounts for trackless work. They are self propelled by air, electric and diesel motive power, depending on their type of application.

Eimcos are proved loaders — more of them are in daily use on hard rock mining jobs throughout the world than all other brands of mechanical loaders combined. Many of these have been in continuous operation for more than 20 years.

An Eimco is always your most economical loading machine. Write for details.

THE EIMCO CORPORATION

Salt Lake City, Utah—U.S.A. • Export Offices: Eimco Bldg., 52 South St., New York City

New York, N. Y. Chicago, Ill. San Francisco, Calif. El Paso, Tex. Birmingham, Ala. Duluth, Minn. Kellogg, Ida. Baltimore, Md. Pittsburgh, Pa. Seattle, Wash. Pasadena, Calif. Houston, Texas Vancouver, B. C. London, England Gateshead, England Paris, France Milan, Italy Johannesburg, South Africa

EIMCO

B-154

Cyanamid REAGENT NEWS

"ore-dressing ideas you can use"

Lead Recovery and Grade Improved with AEROFLOAT® 242 *Promoter*

AEROFLOAT 242 Promoter is a powerful, selective galena promoter with limited frothing properties. It is water-soluble and is usually fed as a 5 to 10% water solution. The following data show results before and after using AEROFLOAT 242 in the lead circuit of a modern lead-zinc mill. (In both cases SODIUM AEROFLOAT® Promoter is the zinc collector):

Reagents lb./ton	**Previously**	**Currently**
Former Reagent	0.10	—
AEROFLOAT 242	—	0.08-0.10
Frother	0.15	0.05
Product		
Lead Conc. % Pb.	80-82	83
% Fe	2.25	1.25
Zinc Conc. % Zn.	62	63
% Pb.	0.5	0.25

The use of AEROFLOAT 242 not only improved the grade of the lead concentrate, but also reduced frother consumption. Where necessary for additional frothing with AEROFLOAT 242, we recommend a higher-alcohol frother such as AEROFROTH® 70, 77 or 80 Frothers or the water-soluble AEROFROTH 65 Frother.

Cyanamid has a flotation chemical for every flotation use. These include AEROFLOAT Promoters, both liquid and dry, AERO* Xanthates, AEROFROTH Frothers, various modifying agents and fatty acid promoters. We will be glad to discuss your flotation problem. A note to our New York office will get prompt attention.

*Trade-Mark

AMERICAN Cyanamid COMPANY

MINERAL DRESSING DEPARTMENT

30 ROCKEFELLER PLAZA, NEW YORK 20, N.Y.

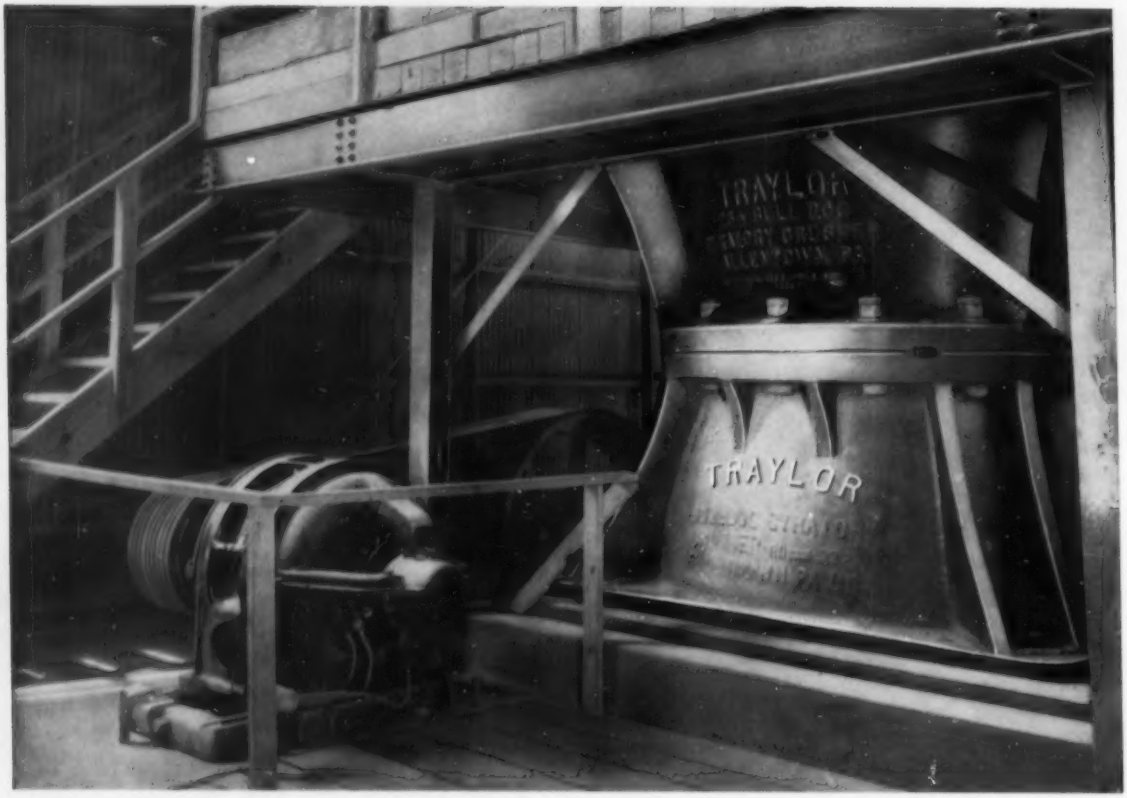
Cable Address — Limenitre, New York

NORTH AMERICAN CYANAMID LIMITED
Royal Bank Bldg., Toronto 1, Ontario, Canada
CYANAMID DE MEXICO, S. A.,
Apartado No. 26012, Mexico 12, D. F., Mexico

CYANAMID PRODUCTS, LTD., Bush House,
Aldwych, London W. C. 2, England
SOUTH AFRICAN CYANAMID (PTY.) LTD.,
P. O. Box 7552, Johannesburg, Union of South Africa

E. P. CADWELL, Casilla 12983,
Correo 11, Santiago, Chile
G. B. O'MALLEY, MALCOLM GLEN,
377 Little Collins St., Melbourne C. 1, Australia

Printed in U. S. A.



TRAYLOR TC GYRATORY CRUSHERS
trim crushing costs 3 ways

1. Traylor TC Crushers enjoy a job-proved reputation for producing great quantities of a uniform product with a single pass through the crusher.

2. Trouble-free, round-the-clock production . . . with capacities up to 66,000 tons per day of an 8″ product . . . is routine operation for a Traylor TC.

3. TC Crushers provide operators with an extra bonus in the form of extremely low maintenance requirements . . . even after years of rugged daily service.

Traylor TC Crushers feature Traylor's original Curved Concaves and Self-tightening Bell Head. Their direct application of crushing force practically eliminates lifting, churning, packing and choking of material in the crushing chamber. Traylor TC crushers are offered in 7 sizes with feed openings from 20″ to 60″ . . . discharge openings from 1½″ to 9″. Check these and other Traylor features in illustrated Bulletin 126. Send for copy today.

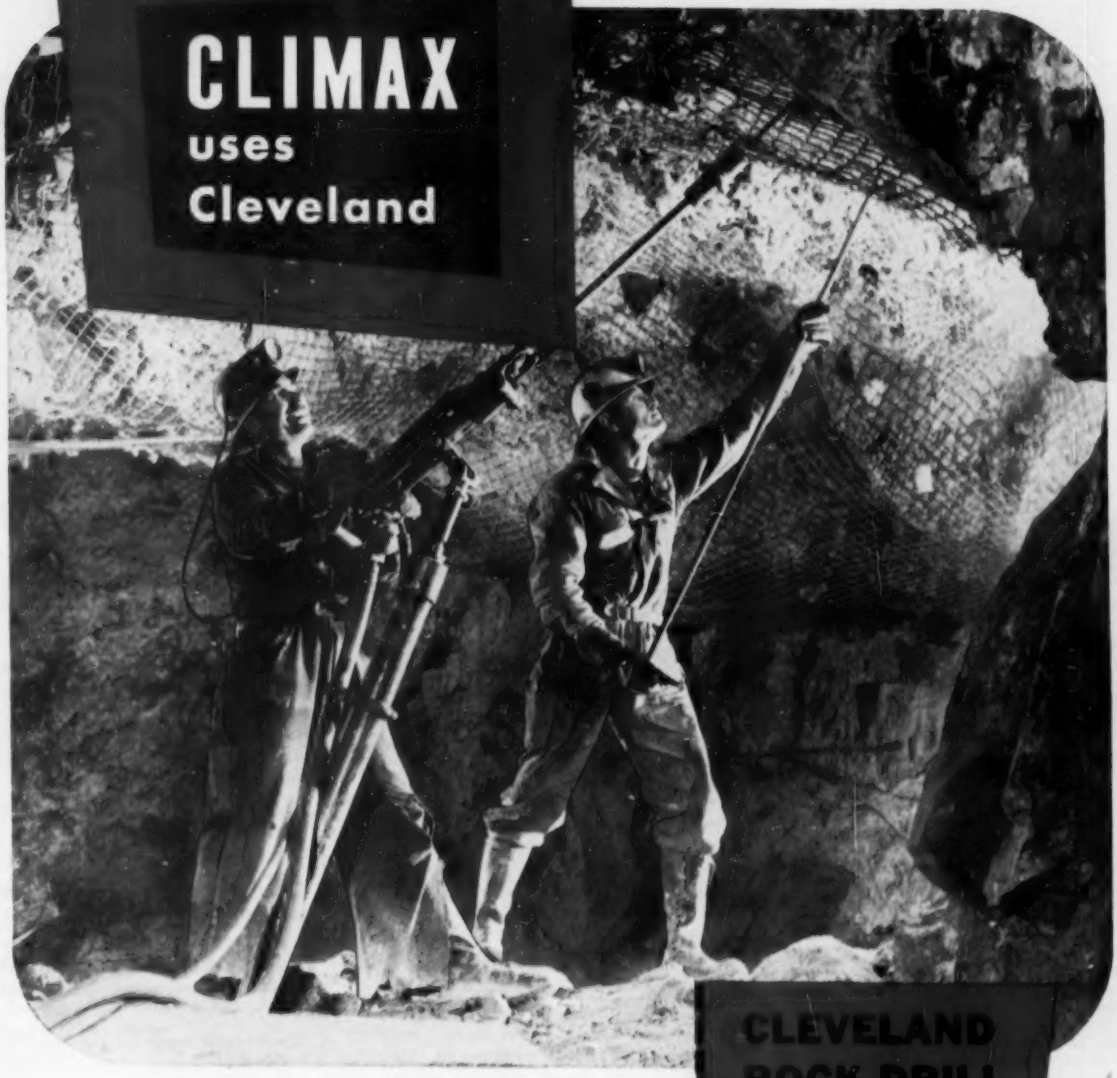
TRAYLOR ENGINEERING & MFG. CO.
733 Mill St., Allentown, Pa.
Canadian Mfrs.: Canadian Vickers, Ltd., Montreal, P. Q.

A Traylor leads to greater profits

SEND FOR BULLETINS
. . . just mention the Traylor Equipment that interests you.

SALES OFFICES · NEW YORK · CHICAGO · SAN FRANCISCO

CLIMAX uses Cleveland



H10AL Drills with AL92 Telescopic Air Legs for slusher drift development. These drill combinations not only drill the 8′ blast round but also the 7′ roof bolt holes. In addition they are also used to tighten the roof bolts and expansion shells to tension resistance in excess of 12 tons. These results are obtained through CLEVELAND superiority in drilling speed, handling and exceptional rotation.

You may test the superior qualities of any CLEVELAND drill in your own mine. Write for Bulletin RD30.

Represented in Colorado, Utah and Wyoming by: Denver Machine Shop, 1409 Blake St., Denver, Colorado and S & M Supply Company, 735 4th Ave., Grand Junction, Colorado.

CLEVELAND ROCK DRILL DIVISION

Westinghouse Air Brake Company

12500 BEREA ROAD
CLEVELAND 11, OHIO

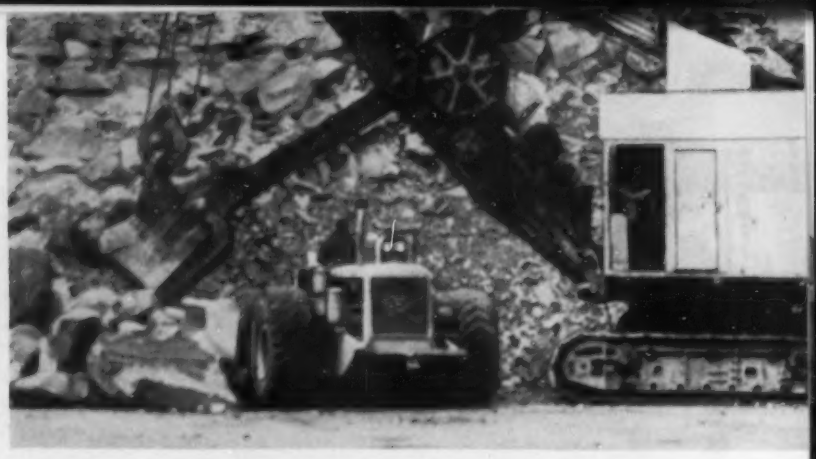
RD-71

3 shovels,

10 trucks,

23 stone stockpiles,

2 waste dumps...



1 tractor handles all cleanup

Too big for shovel to handle, these limestone chunks are dozed into worked-out sections of the pit. Four-wheel drive, 208 hp give tractor plenty of power to push up to 2½ cubic yards (5½ tons) per pass.

Tournatractor can switch up to 10 rail cars at once. Low-pressure tires do no damage to rails, ties, or paved surfaces. Supt. J. M. Christopher reports this unit requires "much less lubrication and considerably less maintenance than crawler-tractors formerly used."

For 100 years, the East St. Louis Stone Company and its predecessors have been quarrying limestone from a pit near Belleville, Illinois. For 100 years, they have dug in different directions, until, today, load areas are far apart and on levels varying from near-surface to over 225 ft. below surface. Three shovels and ten 11-ton trucks are now used to remove about 750,000 tons of stone yearly.

Suppose you were running this big job. Suppose you had to contend with its widely-scattered loading sites, its network of haul roads, and its steep grades. How many tractors would you ask for to do the "housekeeping" chores? How many to handle shovel cleanup? How many for haul road maintenance? Dump cleanup? Stockpiling? Emergency work?

East St. Louis Stone Company's Superintendent, J. M. Christopher, has what you'll probably agree is the most efficient answer possible. He is using *one tractor to do it all!* His choice is a high-speed rubber-tired Tournatractor.

Travels 1670 feet in 1 minute

This mobile unit "runs" from job to job at speeds to 19 mph. It dozes at speeds up to 8 mph. "We sure like its ability to go fast from one place to another," says Mr. Christopher. Its regular assignments, scattered 0.1 to 1.5 miles apart, include:

1. Cleans pit floor around all 3 shovels (1½, 2 and 2½ yds. in size). Works at each shovel two or three times per 8-hour shift. Besides ordinary cleanup, dozes over bank any rock chunks too big for shovel to handle. Typical 150 ft. to 200 ft. one-way push takes one minute . . . backup same distance takes half a minute.
2. Cleans shot stone after blasting at each of the 3 locations.
3. Moves large Joy drill around pit.
4. Levels and cleans around crushed stone stockpiles once or twice a day.
5. Levels waste dump once a day. Material mostly clay mixed with limestone. Tournatractor dozes up to 2½ cubic yards per pass.
6. Blades haul roads for the 10 trucks about once a day.
7. In emergencies, switches railroad cars. Can push 3 full cars (total weight, approximately 240 tons) or 10 empties.

Let us demonstrate

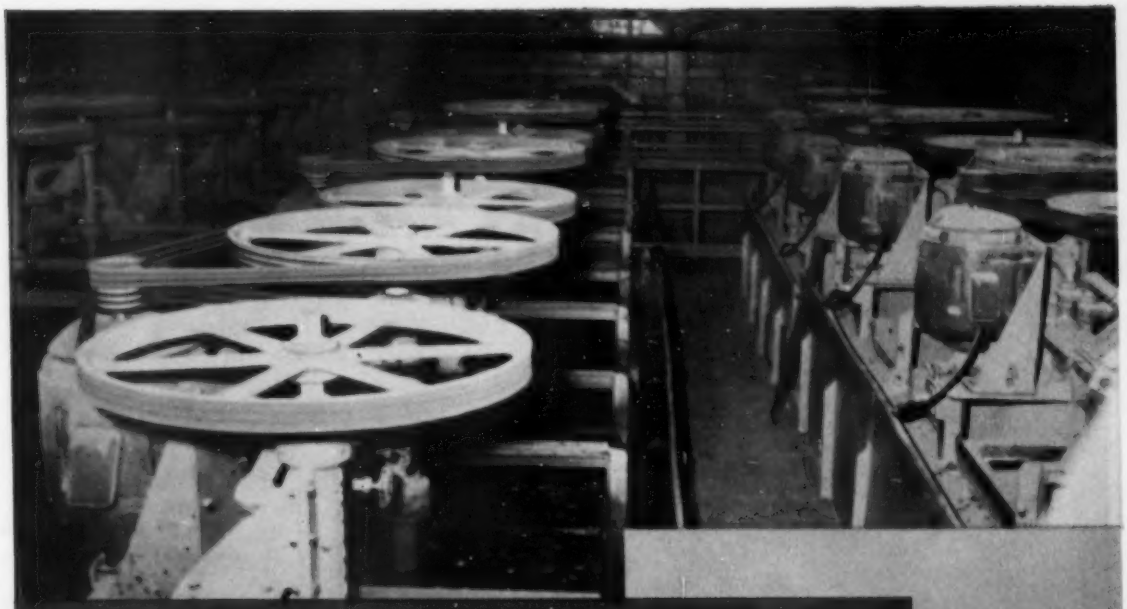
If speed on similar jobs is important to *you*, let us show you the fastest tractor on the market today . . . the 19 mph Tournatractor. We'll be glad to demonstrate on your job, doing the work you're interested in. Call us to arrange time and place.

Tournatractor—Trademark Reg. U.S. Pat. Off. T-787-Q-1

LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company



Agitator cells keep high flow rate with Simplex-ANHYDREX Cable

Here, if ever, is the place where cable dependability is of the utmost importance. If the motors slow down or stop because of mechanical or chemical damage to cable, the smooth flow of material stops, too.

Does it make sense, then, to trust the output of a multimillion-dollar mill to cable on which fifty cents per thousand feet was saved?

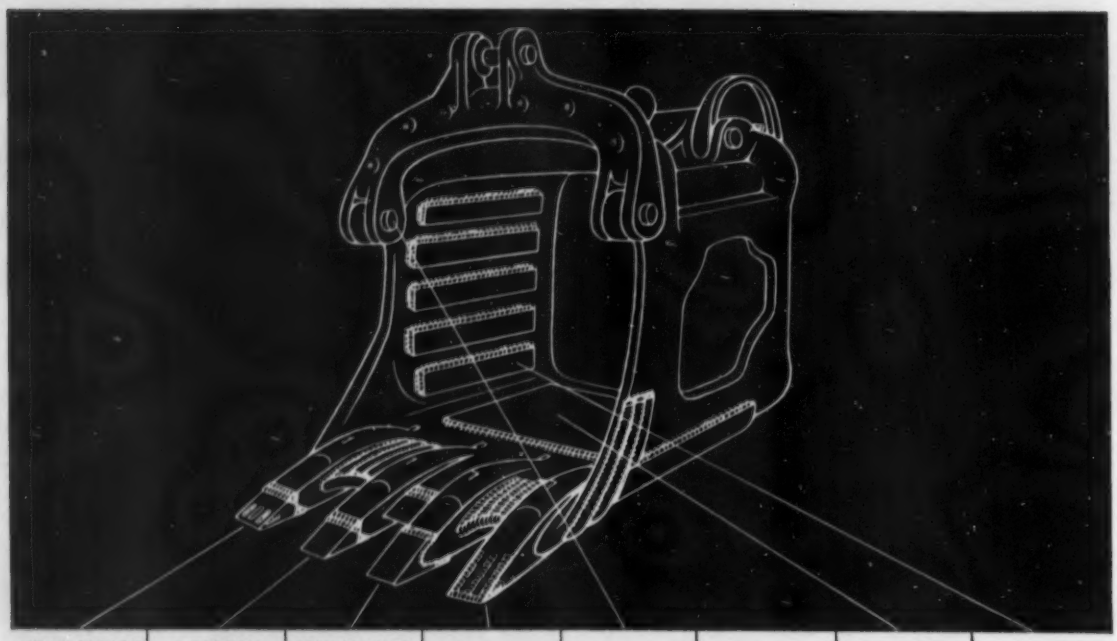
Simplex-ANHYDREX Cable operates dependably whether conduits are contaminated with pine oil, concentrating agents or condensate.

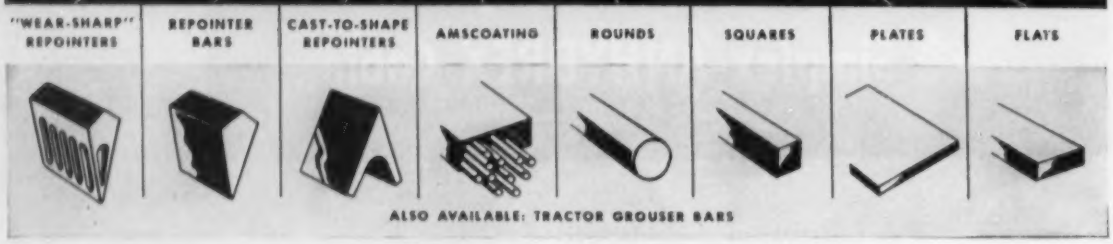
The jacket and particularly the insulation of ANHYDREX Cable is unusually resistant to moisture. These are qualities you want in your power cable. To be sure you get them, be sure you get ANHYDREX.

Simplex
ANHYDREX Cables

SIMPLEX WIRE & CABLE CO., 79 Sidney Street, Cambridge 39, Mass.

For EXTRA TOUGH build-up and repair





. . . use AMSCO® MANGANESE STEEL

Put manganese steel at the points of maximum wear and operate equipment longer between repair periods. Amsco manganese steel outlasts other steels by as much as ten to one under conditions of heavy impact and severe abrasion.

Impact work-hardens the metal to as high as 550 BHN. Further abrasion only polishes this tough steel. Amsco Bulletin WA-77 will show you how and where you can make extensive savings using Amsco manganese steel shapes. Write for it today.

For immediate savings, contact your Amsco distributor. He stocks a complete line of manganese steel shapes and welding equipment. Welding products are distributed in Canada by Canadian Liquid Air Co., Ltd.

Amsco also produces other alloy steels with maximum wear-resistance under particular service conditions . . . and a complete line of hardfacing welding equipment, both rods and machines.

AMERICAN Brake Shoe COMPANY

AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Ill.

Earl Bellamy, mine foreman, Golconda Lead Mines, Wallace, Idaho

"UNOBA Grease eliminated wheel bearing failures here"

"A Union Oil Company lube engineer solved one of our greatest lubrication problems by showing us how UNOBA Grease eliminated wheel bearing failures here on our mine cars and trammers.

"Because we have several submerged track sections in this mine we used to have a lot of trouble with lubricants emulsifying and washing out of wheel bearings . . . leaving them exposed to the action of water and abrasive mud.

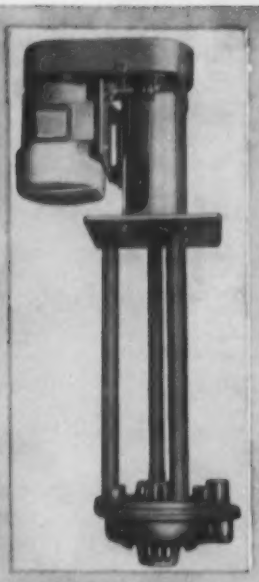
"Now, with UNOBA in these bearings, failures are a thing of the past, and we needn't lubricate them oftener than twice a year. Believe me, UNOBA has saved us a lot of time and money at Golconda just by keeping our 3 trammers and 13 cars all rolling."

Extraordinary resistance to water is just one characteristic of *multipurpose* UNOBA Grease which makes it so resistant to acid and alkaline conditions as well as extreme temperatures and pressures. Ask your nearby Union Oil representative to specify the proper grade for use in your mining operation.

UNION OIL COMPANY
OF CALIFORNIA

76

Los Angeles: Union Oil Bldg. • New York: 45 Rockefeller Plaza • Chicago: 1612 Bankers Bldg. • New Orleans: 644 National Bank of Commerce Bldg. Atlanta: 401 Atlanta National Bldg. • Kansas City, Mo.: 612 W. 47th St.

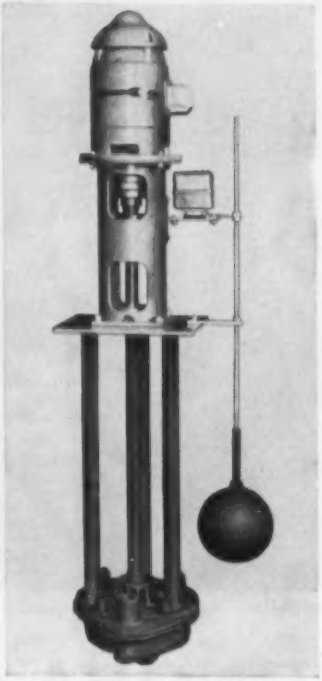


Model 300 Sump Pump

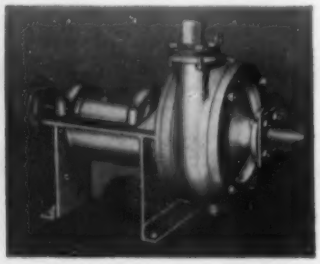
Galigher Acid-Proof SUMP PUMP

SLURRIES • CORROSIVES • FROTHS

This rugged, welded steel, rubber covered sump and froth pump is built to handle industry's toughest pumping jobs. Its application covers hundreds of materials in a score of industries including pumping acids, salts and chemicals and material containing up to 60 per cent solids—does not air lock or choke. The following are typical daily jobs in mining, metallurgical and chemical industries: floor clean-up . . . flotation tailings, concentrates and middling froth return . . . acid leakage from process tanks . . . solution transfer . . . uranium leach slurries and solutions . . . mine drainage . . . pickling solution . . . waste disposal . . . HCl, $CaCl_2$, HNO_3, H_2SO_4, H_2SO_3 . . . ceramics handling . . . saturated brines.



Model 200 Sump Pump



We also manufacture the well known VACSEAL pump for material handling and corrosive solutions. Sizes 1½" to 8".

- **CAPACITY**
  Pumps illustrated (models 200 and 300) deliver up to 100 GPM, handling heads up to 60 feet.
- **VERSATILE DESIGN**
  Light, portable—Intermittent or continuous operation—Direct or V-belt drive—Constant or variable speed.
- **SIMPLE CONSTRUCTION**
  No submerged bearings—No packing gland—No mechanical seal—Rubber-covered parts—Solid rubber impeller—Double suction thrustless impeller.

MAIL COUPON
for detailed information on your pumping problem.

THE GALIGHER CO.
P. O. Box 209, Salt Lake City 10, Ut.
Gentlemen:
Please send me information on a pump that will handle the following:

1. Liquid.....
2. % solids.....
3. °F.....
4. pH.... Type of acid.....
5. GPM.....
6. Head (ft.).....

Name.....
Company.....
Address.....

Leaders in Experience and Service

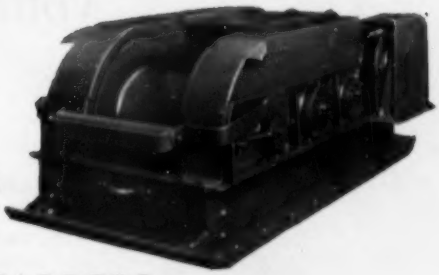
THE GALIGHER CO.

METALLURGICAL DIVISION · ENGINEERING SERVICE

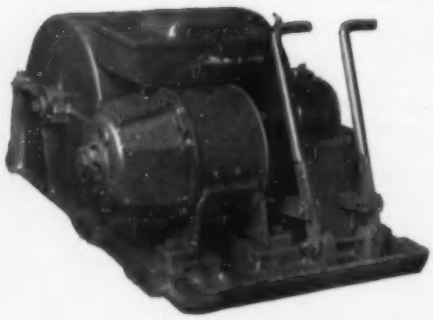
CONSULTATION • ORE TESTING
PLANT DESIGN • GEOLOGIC INVESTIGATION

HOME OFFICE: P. O. Box 209 • Salt Lake City 10, Utah
EASTERN OFFICE: 921 Bergen Ave. (Room 721) • Jersey City 6, N. J.

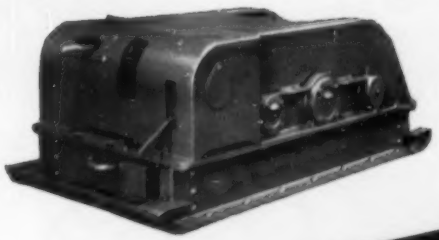
YOU CAN FIND A SURE CURE for a "hoisting headache" with a BROWNIE HOIST!



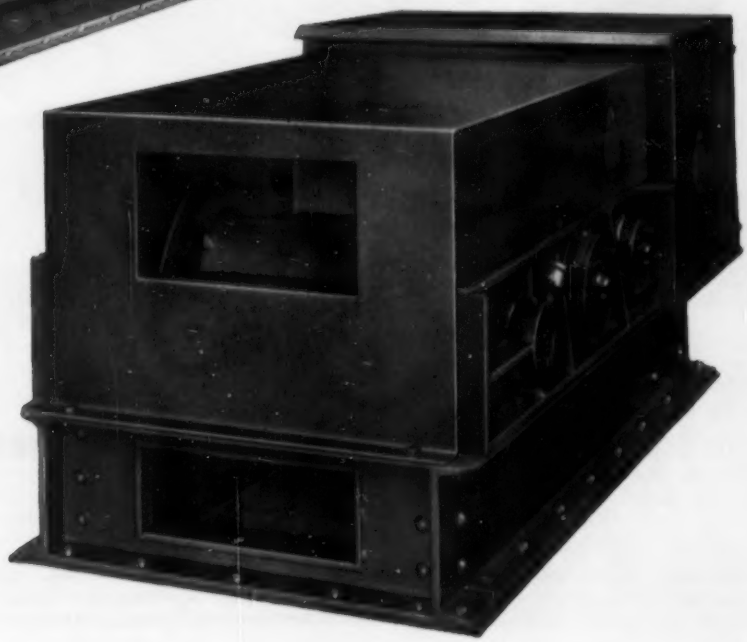
RIGGING HOISTS
HAULAGE HOISTS
ROOM HOISTS
HOIST-RETARDERS
CAR SPOTTING HOISTS



IN MINING OF ALL TYPES, there's no haulage hoist problem that cannot be handled by a "BROWNIE". Hoists with a reputation of long standing for dependable service and the ability to take the punching of constant haulage. For almost 40 years we have devoted our entire engineering know-how to mining requirements. Among our various types and models available are hoists with rated capacities from 2,000 to 24,000 lbs. rope pull and with speeds from 25 to 300 feet per minute.



And now, remote push-button control is available to save time where practicable. Let us discuss your problems with you for greater efficiency and more effective service. Brown-Fayro Division of SANFORD-DAY IRON WORKS, P. O. Box 1511 . . . Telephone 3-4191, Knoxville, Tennessee.



Brown-Fayro Division

SANFORD-DAY
IRON WORKS

Knoxville, Tennessee

IN GRINDING MATERIALS

your best buy is CF&I

. . . AND HERE'S WHY: All grinding balls look alike, and cost pretty much the same. This holds true for grinding rods, too. This being the case, the best way to buy is on the reputation of the manufacturer and the performance record of his products.

CF&I, for example, has an established reputation as a leading manufacturer of quality products for use in the mining industry. Having grown up in close geographical proximity to the western mining industry, CF&I has gained unmatched "know-how" in the production of grinding materials. It is this "know-how," applied at every point in the manufacturing process from ore to finished product, that assures you of getting the best when you specify CF&I Grinding Balls or Rods . . . whatever your grinding application.

As for product performance, CF&I Grinding Balls, forged from special analysis steel, have an ideal balance between toughness and hardness . . . are well known for their optimum grinding ability and wearability. And CF&I Grinding Rods, also made from special analysis steel, machine straightened, and with square-cut ends, have an established reputation for efficiency and economy in grinding operations.

Whatever your grinding material needs, it will pay you to consider CF&I Grinding Balls and Grinding Rods. Contact your CF&I representative to discuss your requirements.

CF&I

THE COLORADO FUEL AND IRON CORPORATION

3563

Albuquerque • Amarillo • Atlanta • Billings • Boise • Boston • Buffalo • Butte • Casper • Chicago • Denver • Detroit • El Paso • Ft. Worth • Houston Lincoln (Neb.) • Los Angeles • New Orleans • New York • Oakland • Oklahoma City • Philadelphia • Phoenix • Portland • Pueblo • Salt Lake City • San Antonio San Francisco • Seattle • Spokane • Wichita • ***CANADIAN REPRESENTATIVES AT:*** Calgary • Edmonton • Montreal • Toronto • Vancouver • Winnipeg

MAKE ONE DRILL STEEL DO THE WORK OF MANY!

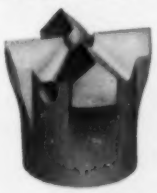
TIMKEN® interchangeable rock bits let you switch bits without switching drill steels

IT pays to switch bit types as the ground changes. The most economical way to do this is to use Timken® carbide insert and multi-use rock bits. In less than a minute, drillers can unscrew one type of Timken bit and screw on a different one—right on the job. No time wasted going after another set of drill steels. No need to stock expensive double inventories because dozens of Timken carbide insert and multi-use bits are interchangeable on the *same* drill steel.

When you use Timken interchangeable rock bits, you know your drillers will always have the most economical bit for the ground being drilled—Timken multi-use bits for ordinary ground, Timken carbide insert bits for hard, abrasive ground.

Both of these Timken rock bits give you two important advantages: 1) they are made from electric furnace Timken alloy steel, 2) a special shoulder union keeps drilling impact from damaging threads.

Our rock bit engineers may be able to help you with your drilling problems. They're experts in cutting drilling costs. There's no obligation. Write The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".



WHERE YOU CUT COSTS WITH TIMKEN MULTI-USE BITS

Most economical for ordinary ground. With correct and controlled reconditioning, they give lowest cost per foot of hole when full increments of steel can be drilled.

WHERE YOU CUT COSTS WITH TIMKEN CARBIDE INSERT BITS

Give highest speed through hard, abrasive ground. Also most economical for constant-gauge holes, small diameter holes, very deep holes.

... your best bet for the best bit... for every job

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

Bigger, faster loads with the new LOWBOWL SCRAPERS

18 CU. YD. STRUCK
25 CU. YD. HEAPED

How Caterpillar's new, exclusive LOWBOWL design pays off for you!

Compare these two scrapers – the new No. 470 with LOWBOWL design and the sideboarded No. 21.

Both scrapers were loaded with the same material under identical conditions.

Result: the No. 470's net load weighed 5000 pounds *more* than the load in the No. 21–which is a profitable margin in favor of LOWBOWL design.

The LOWBOWL concept features a bowl that has been widened and lengthened, and bowl depth has been decreased. Incoming material, meeting less overhead weight and internal friction, is loaded with less resistance clear out to the end of the loading cycle.

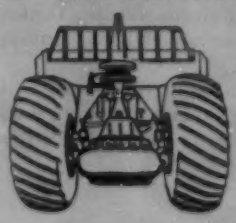
Result: faster loading for LOWBOWL design. Both the No. 470 and No. 456 feature this new concept in scraper engineering.

New No. 470 Scraper (left) with 5000 pounds more load than sideboarded No. 21 Scraper (right).

"BIG PRODUCTION" FEATURES

MORE POWER—300 HP at 1800 r.p.m. Ten per cent more rimpull. New 6-cylinder Cat Engine. Requires only one operating adjustment. Fan-belt tension regulated by convenient setscrew-adjustment of generator.

NEW TURBOCHARGER, driven by engine exhaust, utilizes energy which would otherwise be lost. Packs air into engine according to engine load, not speed. Delivers more working HP—greater performance.



NEW, BIG WIDE-SECTION 29.5-29 TIRES, developed after 3 years of Caterpillar and tire manufacturer research on actual earthmoving jobs, operate at lower pressures and provide greater flotation and traction.

LARGE AREA PUSHBLOCK gives better pusher contact, faster loading.

More power, bigger capacity in the new DW20-DW21 TRACTORS

300 HP

THE NEW FOUR-WHEEL CAT® DW20 Series E with new No. 456 LOWBOWL Scraper. Also available with the new W20 Wagon; capacity—20 cu. yd. struck. The new two-wheel DW21 Series C is available with the new No. 470 LOWBOWL Scraper.

In the DW20 Series E and DW21 Series C, Caterpillar offers you two new tractors and matched scrapers with exclusive LOWBOWL design.

Replacing the DW20 and DW21, world-famed earthmoving pace-setters, these new machines are built to deliver a new standard of money-making performance.

Their new LOWBOWL design utilizes maximum tractor and pusher power for bigger loads, faster loading times. Their greater power means faster cycles.

For complete facts, see your Caterpillar Dealer!

Caterpillar Tractor Co., San Leandro, Cal., Peoria, Illinois, U.S.A.

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

NEW DW20-DW21, LATEST EXAMPLES OF LEADERSHIP IN ACTION

OF THE NEW DW20-DW21

INCREASED HIGH APRON LIFT provides faster ejection of any material.

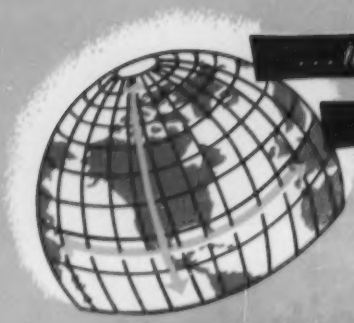
INCREASED SCRAPER GROUND CLEARANCE enables units to work even under extremely "soft" conditions.

HIGH SPEEDS FOR FAST HAULS
DW20 Series E, 2.8 to 32.1 m.p.h.
DW21 Series C, 3.3 to 30.6 m.p.h.

CHOICE OF STARTING METHODS, optional 24-volt direct electric or gasoline starting engine with 6-volt starting motor.

AUTOMATIC CABLE SAVER, standard equipment.

PLUS IMPROVED BRAKE CONTROL, more easily removed DW20 hitch arrangement, better protected DW21 hydraulic steering system and many other new and thoroughly tested Caterpillar features.



. . . from the ARCTIC to the EQUATOR

. . . from the FAR EAST to CONTINENTAL EUROPE

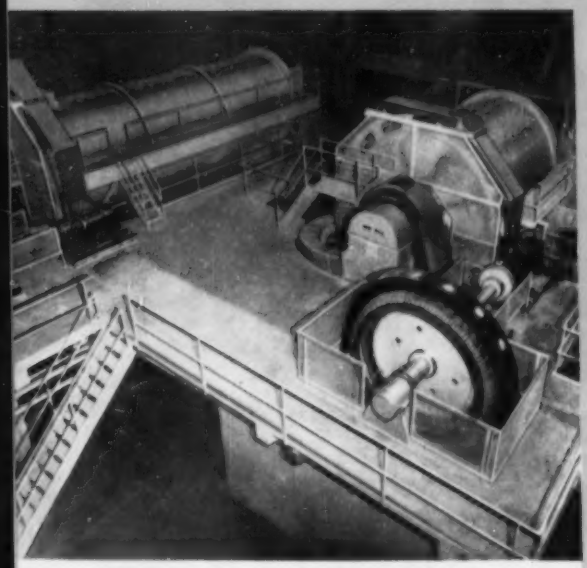
NORDBERG

are Industries' choice for the efficient

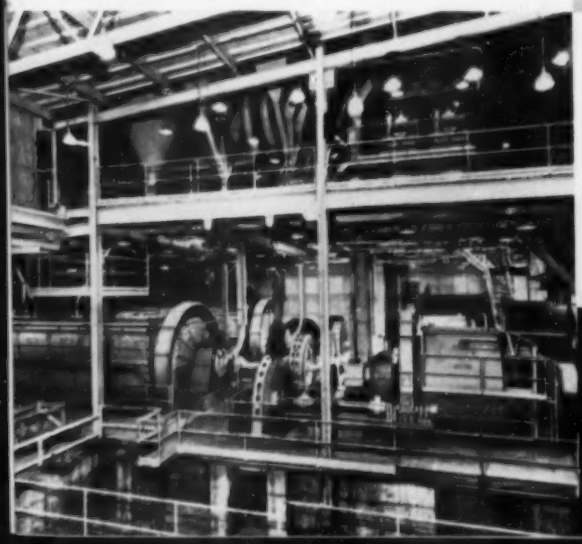
These six Nordberg 10'8" by 17' wet grinding Ball Mills efficiently serve a large Taconite reduction plant.

GRINDING MILLS

reduction of ORES, CEMENT and MINERALS



These two views show eight Nordberg Grinding Mills used for raw and finish grinding in the plants of a leading cement producer. Above is a 10'8" by 16' Ball Mill and a 9'6" by 32' Compartment Mill. Below are two 10'8" by 17' and two 9'6" by 11' Ball Mills, together with two 8'6" by 36' Compartment Mills.



MORE than half a century of progressive engineering achievement, combined with quality production in modern manufacturing facilities, have won for Nordberg a foremost position in the field of heavy machinery manufacture.

This is evidenced by the universal acceptance which Nordberg Machinery has received by most of the Mining and Mineral processing industries throughout the world.

Typical of this heavy machinery is the complete line of Nordberg Grinding Mills for raw and finish grinding of cement materials, the fine reduction of metallic and non-metallic minerals and for numerous other processes where friable material must be comminuted to fine sizes.

Nordberg manufactures Ball, Tube, Rod and Compartment Mills, of grate, overflow and peripheral discharge types for wet or dry grinding service, in sizes ranging from 6 feet to 13 feet in diameter, and up to 50 feet in length.

For large or small operations, you can depend on Nordberg Machinery to deliver maximum output at lowest possible cost. Write for further information. *NORDBERG MFG. CO., Milwaukee, Wis.*

SYMONS . . . a registered Nordberg trademark known throughout the world

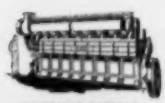
SYMONS GYRATORY CRUSHERS

SYMONS CONE CRUSHERS

SYMONS VIBRATING GRIZZLIES and SCREENS

SYMONS V-SCREENS

NORDBERG KILNS and COOLERS



NORDBERG DIESELS— 10 to over 12,000 H.P.

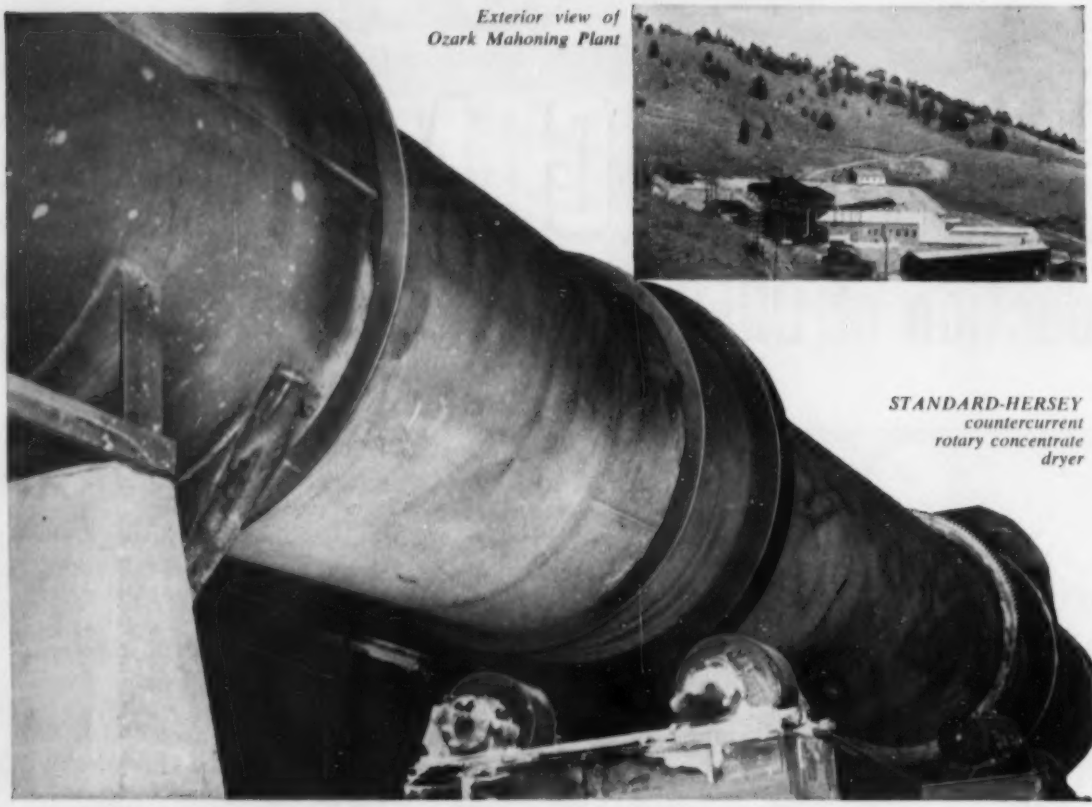
©1955, Nordberg Mfg. Co.

GM155

NORDBERG

MACHINERY FOR PROCESSING ORES and INDUSTRIAL MINERALS

NEW YORK • SAN FRANCISCO • DULUTH • WASHINGTON
TORONTO • MEXICO, D.F. • LONDON • JOHANNESBURG



Exterior view of Ozark Mahoning Plant

STANDARD-HERSEY countercurrent rotary concentrate dryer

FLUORSPAR CONCENTRATE DRIED TO ALMOST 0% MOISTURE BY A

STANDARD HERSEY ROTARY DRYER

The Northgate, Colorado plant of Ozark Mahoning Co. produces Acid Grade Fluorspar exclusively. Since their flotation concentrator went into production in October of 1952, output has increased to the point where their Standard-Hersey dryer *is now operating at 150% rated capacity.*

The filter cake, produced in Denver equipment, is transported by screw conveyer to a stacking belt for stock piling and sampling, or directly into the 6′ by 50′ Standard-Hersey countercurrent rotary dryer. Moisture in the concentrate is reduced by the dryer from 12-14% to approximately 0% for shipment.

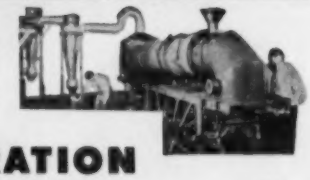
The dryer is lined throughout its length with refractories, as is the dryer furnace. Exhaust gasses at 350°F. pass through a cyclone type dry dust collection system with a balanced airlock arrangement. The temperature of the discharge product is 450°F. Semi-automatic burner controls provide efficient operation of the dryer unit.

The unusually large diameter of the dryer was selected to minimize the velocity of the gas stream through the dryer thus reducing concentrate dust loss to an estimated 1-ton of concentrate per 24 hours.

The engineering staff of the 52 year old Standard Steel Corporation has thousands of successful dryer applications to draw on in solving your problems. Over 30 types of dryers are available to fill almost every drying need in the chemical and food fields.

SEND FOR FREE 12-PAGE ILLUSTRATED BULLETIN
Learn how STANDARD-HERSEY has aided manufacturers throughout the world in solving their dryer problems.

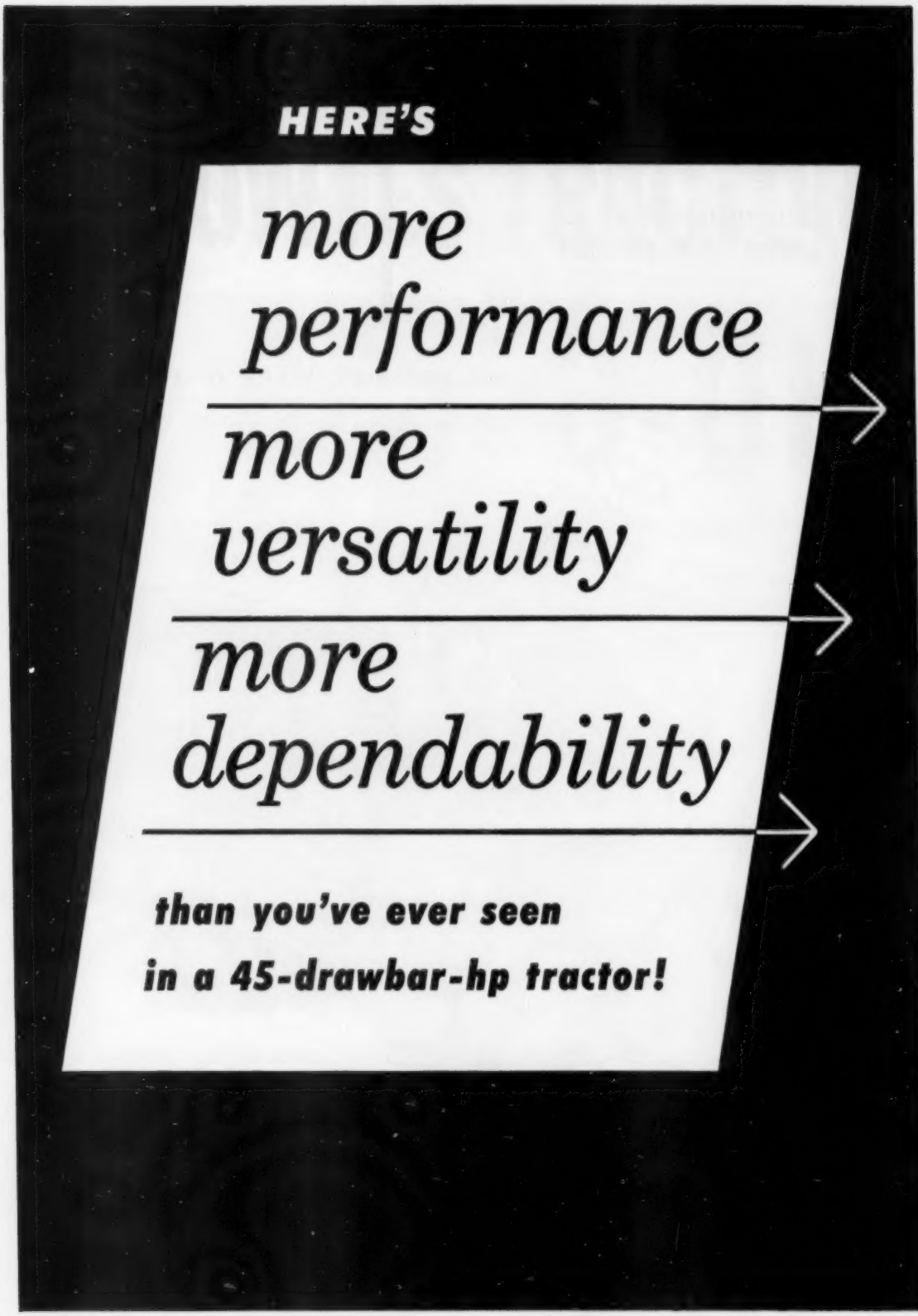
COMPLETE PILOT PLANT TAKES GUESSWORK OUT OF DRYING
STANDARD-HERSEY'S pilot dryers play an important part in solving your drying problems *before* blueprint stage.



THE STANDARD FOR 52 YEARS

STANDARD STEEL CORPORATION
5031 Boyle Avenue, Los Angeles 58 • 15 Park Row, New York 31

DF-3


HERE'S
more performance
more versatility
more dependability
than you've ever seen
in a 45-drawbar-hp tractor!

more performance . . .
FOR SUSTAINED HIGH OUTPUT!

more versatility . . .
FOR A WIDER RANGE OF WORK!

more dependability . . .
FOR LOWER JOB COSTS!

TWO NEW

HD-6

BULLDOZER-DRAWBAR TRACTOR
. . . an all-round tractor balanced for outstanding performance with both mounted and drawn equipment.

Weight	12,400
Drawbar hp	45
Belt hp	55
Net engine hp	57
Track length	5' 4¼"
No. of truck wheels per track	4

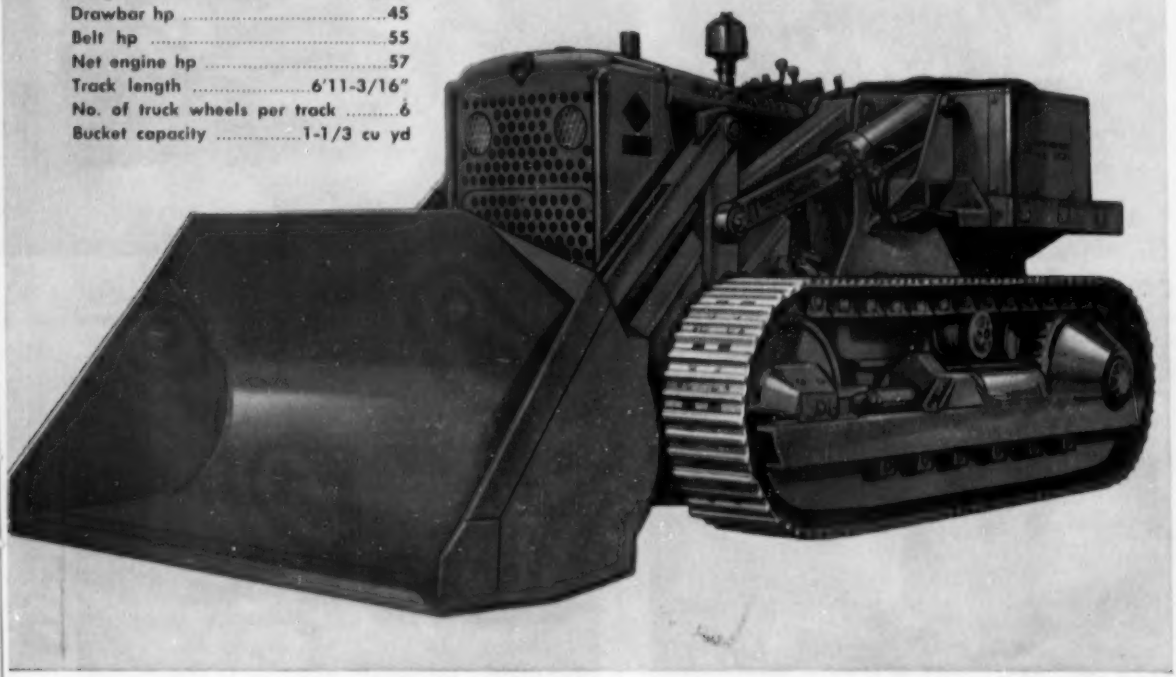
WITH ALL THE IMPORTANT PERFORMANCE ADVANTAGES OF ALLIS-CHALMERS ADVANCED BASIC DESIGN . . .
tested and proved over millions of operating hours!

ALLIS-CHALMERS ANNOUNCES
HD-6 SERIES TRACTORS

HD-6G

TRACTOR SHOVEL
. . . with the shovel a "built-in" part of the tractor — not just an attachment.

Weight	19,600
Drawbar hp	45
Belt hp	55
Net engine hp	57
Track length	6'11-3/16"
No. of truck wheels per track	6
Bucket capacity	1-1/3 cu yd

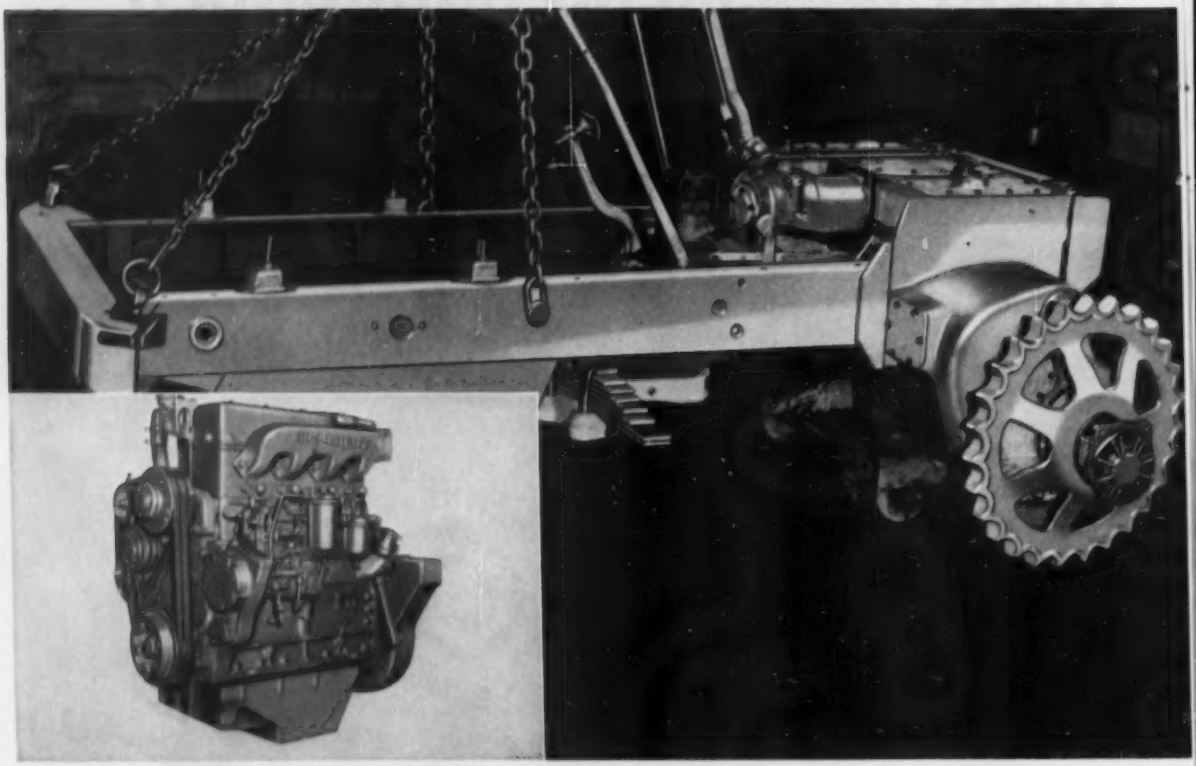


The HD-6 series represents the most advanced engineering in the tractor business — not just in features, but in *basic design*. That means plenty of power, balance throughout the tractor, strength in *all* components, weight in the *working* parts where it does the most good, and big safety factors. It also means engineering for the use of mounted equipment, and for easier, better operation and maintenance.

Following are just a few of the many features that reflect this advanced basic design . . . help to bring you higher production, more work done . . . lower job costs.

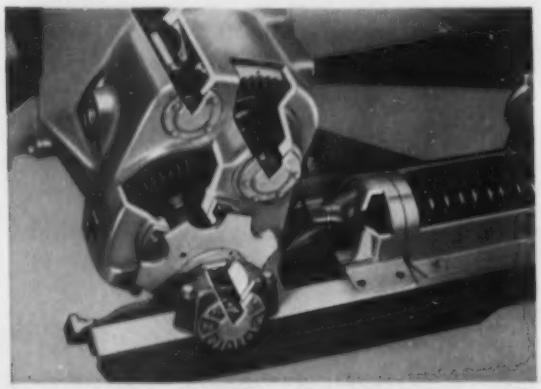
Inside Facts on

NEW ALLIS-CHALMERS HD-6 SERIES TRACTORS



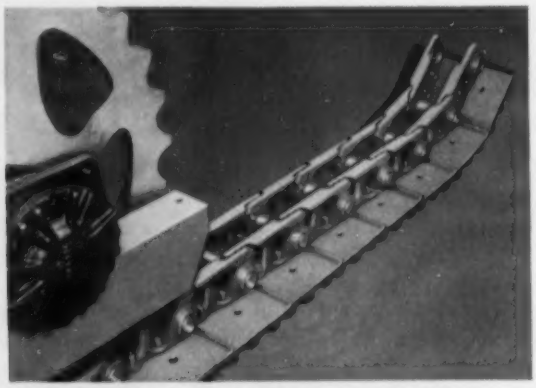
POWER, STRENGTH AND PROTECTION

Here are two important features of the HD-6 series. First, the new Allis-Chalmers diesel, with follow-through combustion — a sure bet for top performance, long life, low upkeep costs. Second, the exclusive all-steel box-A main frame. It protects the entire power train from shock loads, makes possible superior over-all balance, better equipment mounting . . . plus the service simplicity of unit construction. Major assemblies like engine and clutches can be easily removed without disturbing adjacent parts.



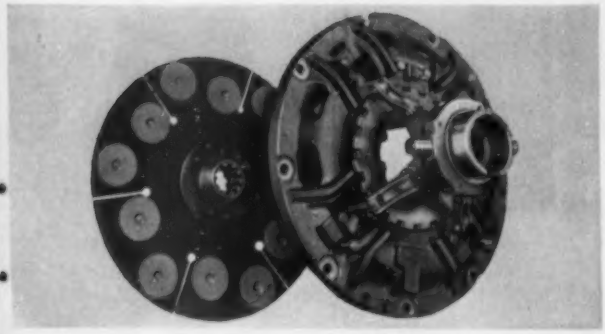
STRADDLE-MOUNTED FINAL DRIVE GEARS

Tapered roller bearings support both ends of the final drive gear shafts. With smaller gears and shorter shafts (plus line-bored, one-piece case), that means better bearing and gear alignment, more strength, longer life . . . even with the big load requirements of today's mounted equipment. And *double-reduction* final drives provide greater ground clearance.



NEW-DESIGN, HEAVY-DUTY TRACK

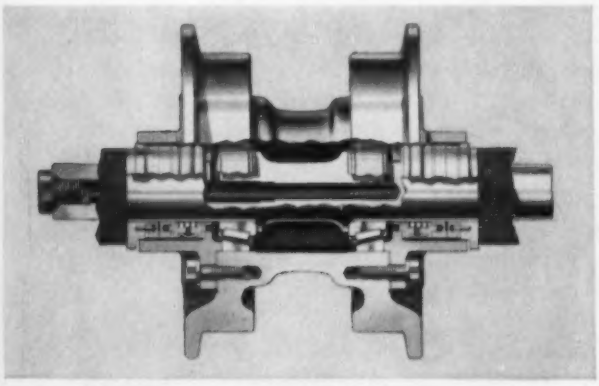
The best available methods in metallurgy and manufacturing are used to produce HD-6 track that will provide long life under the toughest conditions. In addition to new over-all design, HD-6 sidebars benefit from new heat-treating methods which make possible new standards of strength and hardness *throughout* for extra wearability.



EXTRA CLUTCH LIFE — WITH CERAMIC LINING — The HD-6 master clutch offers simple, single-plate, overcenter design. Revolutionary new *ceramic* button clutch lining keeps clutch operating longer between adjustments . . . lengthens clutch life . . . reduces lever pull for easier operation.

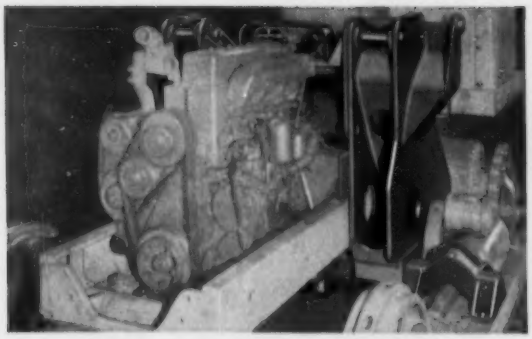
BIG, WELL-PROTECTED RADIATOR

Extra large, one-piece radiator provides all-weather cooling capacity. "Wrap-around" guard enables core to be mounted independently of guard for maximum strength and protection . . . and guard tilts forward for easy service accessibility.



SIMPLIFIED LUBRICATION

Truck wheels, idlers, support rollers need lubrication only once every 1,000 hours . . . because tapered roller bearings let Positive Seals work effectively to keep out dirt and moisture. No lube points under the tractor . . . no lubrication needed more often than every 75 hours. Go from one to two weeks without needing a grease gun.



HD-6G TRACTOR SHOVEL FEATURES

Here's the HD-6G shovel frame mounting assembly. The base of the side frame is mounted in the front to the tractor rigid beam, and at the rear to the truck frame. The upper part is bolted to a heavy steel "stabilizer" forming the cowl of the tractor. Together with the HD-6G's new hydraulic system, it provides greater strength, service simplicity and operator visibility. The HD-6G also offers a new two-position bucket, a two-speed reverse, and has extra long track, with six truck wheels on each side.

FEATURES AVAILABLE ONLY IN HD-6

. . . no other tractor in this size class has them — all-steel main frame; one-piece steering clutch and final drive housing; double reduction final drives; welded steel truck frames; roller bearing truck wheels, idlers and support rollers; extra-heavy truck wheels and guards available; Tru-Dimension tracks; wrap-around radiator guards; engine-mounted bulldozers; heavy-duty Allis-Chalmers diesel engine with "follow-through" combustion; rubber engine mounting pads; ceramic button master clutch lining; unit construction; 1,000-hour lubrication intervals for truck wheels, idlers and support rollers; 24-volt direct electric starting (standard); crankcase guard (standard); bumper and lights (standard).

Write now for more facts . . . or see your nearby Allis-Chalmers dealer

ALLIS-CHALMERS
Construction Machinery Division
Milwaukee 1, Wisconsin

Please rush more information on the new HD-6.

☐ Bulldozer-Drawbar Tractor ☐ Tractor Shovel

Name .....

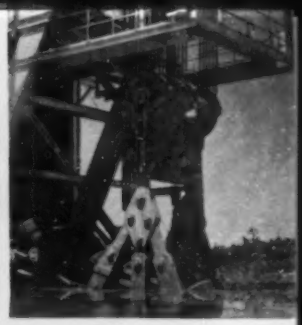
Title .....

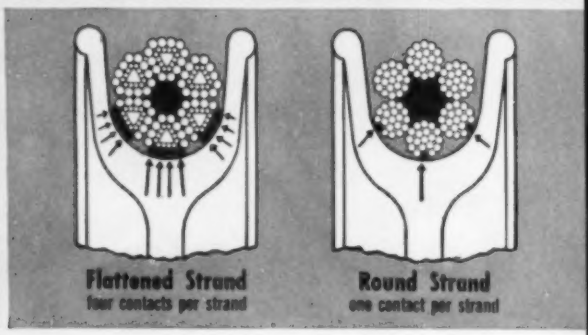
Company .....

Address .....

City ..... State .....

ALLIS-CHALMERS





How to handle the tough jobs with Hercules Flattened Strand wire rope

When you think you need a super-rope, check Hercules Flattened Strand. This is the wire rope that packs in 10% more steel than round strand rope, making it 10% stronger and safer. It wears longer and more evenly—reduces sheave wear, too.

The 10% extra strength over round strand rope is sometimes the difference between the possible and the impossible. Hercules Flattened Strand frequently does the tough jobs which would otherwise require larger size rope—and without the bother and expense of changing sheaves and drums. The extra strength is useful, too, when shock loading is involved. Saves rope and money.

If you think that Hercules Flattened Strand wire rope may solve a problem, talk it over first with your Leschen man. He can be reached through your nearby Leschen distributor. His advice is based on the best possible authority—Leschen's long experience and engineering research—the longest in the industry. And with Leschen wire rope you are assured of higher-than-rated quality and longer-than-expected service.

If you can use Hercules Flattened Strand rope you'll be money ahead. See about it soon.

LESCHEN

HERCULES *Red-Strand*® **WIRE ROPE**

LESCHEN WIRE ROPE

Depend on Leschen's higher-than-rated quality for longer-than-expected service.

HKP

LESCHEN WIRE ROPE DIVISION
H. K. PORTER COMPANY, INC.
St. Louis 12, Missouri

Drifts and Crosscuts

Stan Dayton Promoted to Associate Editor . . .

Stanley H. Dayton, former field editor of MINING WORLD, has recently been appointed associate editor of the magazine in a move to improve the services and coverage offered by the publication. In his new position, Mr. Dayton will be able to devote increased time and energy on research in the mining industry's ever-changing picture.

The new associate editor was born and raised in the northwestern United States. He graduated from Washington State College in 1950 with bachelor of science degrees in mining engineering and metallurgical engineering.

Following graduation, he worked for the Nancy Lee Mining Company in western Montana, serving in various supervisory capacities. Two years later he was employed by the engineering staff of The Anaconda Company at Butte. His experience there was chiefly in block caving.

In January 1954, Mr. Dayton joined MINING WORLD, serving as field editor and handling special editorial assignments, which have taken him throughout the western mining areas. His latest trip was to the Colorado Plateau uranium country, and MINING WORLD readers will get a glimpse of newest mining and metallurgical developments there through a series of articles scheduled for future issues.

As Hank Grundstedt Joins MINING WORLD

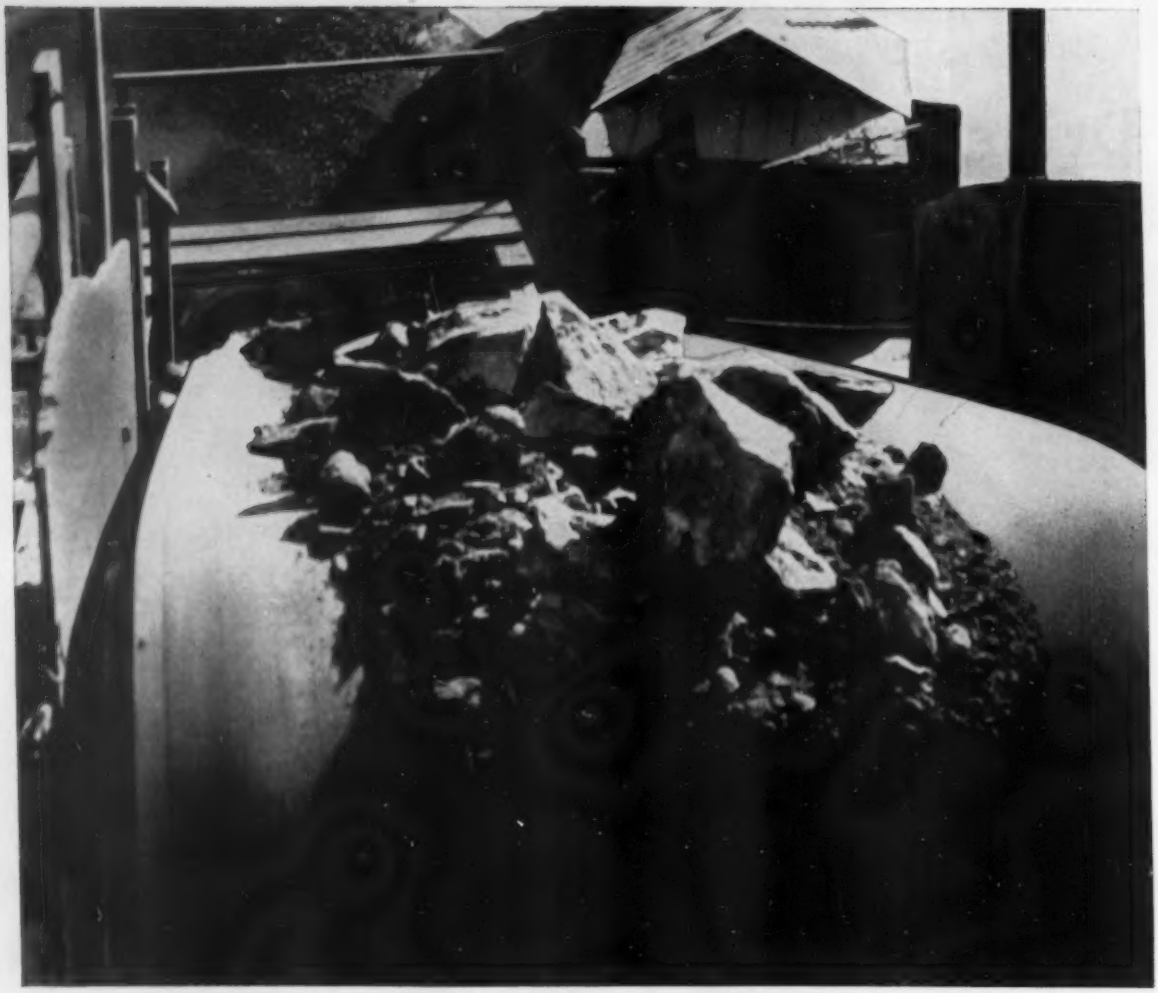
The staff of MINING WORLD has recently been increased by the addition of Henry G. Grundstedt, Mining Engineer. Mr. Grundstedt will serve in the capacity of Manager of Engineering Services. With his knowledge of engineering and mining equipment, he will be a valuable asset to the publication.

Hailing from Tucson, Arizona, Mr. Grundstedt is a graduate of the University of Arizona's College of Mines. There he received his degree in Mining Engineering in 1950.

His first year after graduation was spent at the Christmas mine in Christmas, Arizona, where he served as mine engineer. Following this, he worked for the Atlas Diesel Corporation of Sweden, assisting with the introduction of the Swedish rock drilling method to United States miners. His travels for Atlas took him to most of the mining operations in the southwestern United States.

Later Mr. Grundstedt worked in various engineering and supervisory capacities in Arizona copper mines and the uranium mines of the Colorado Plateau. Until recently he has operated his own engineering service company at Tucson.

We all feel sure that Mr. Grundstedt's versatile mining experiences will benefit MINING WORLD's readers and advertisers.



New Conveyor Belt Combines Increased Strength With Extra Flexibility

Rugged Mainliner - Conveyking conveyor belt is engineered for tough jobs involving high tensions, high lifts and long center distances. It's ideal for conveying aggregates, coal and ores. It's steel-like in strength, practically stretchless, yet extremely flexible and troughs easily.

Mainliner belts have about twice the strength of ordinary cotton duck belts of the same gauge. They resist the destructive action of water, oil, weather and age. Why? Because these belts are made of multiple plies of strong duck with Nylon woven across the width and a new-process, high-strength cotton woven lengthwise, with skim coats between plies. They are available in any lengths, with any number of plies, in widths up to 72".

Like other heavy duty belts, these Mainliner Conveyking belts are custom made to meet particular requirements of individual jobs. They can be made with a cover tensile strength of 3500 to 4000 pounds average and a friction pull of 20 to 24 pounds average. They can also be made with a cover tensile strength of 2500 to 3000 pounds and a friction pull of 16 to 19 pounds. They are also available in oil-resistant Neoprene. All are mildew inhibited throughout. A breaker strip can be included in top cover, if specified.

We also manufacture a complete line of industrial rubber products: hose, belting, packing and moulded rubber of every construction for every need. *Through your Quaker and Quaker Pioneer distributor* our research and engineering services are always available to help you solve any industrial rubber problem. *Write for free folder and name of distributor.*

DIVISIONS OF HKP H. K. PORTER COMPANY, INC.

QUAKER RUBBER CORPORATION
Philadelphia 24, Pennsylvania

QUAKER PIONEER RUBBER MILLS
San Francisco 7, California

Capitol Concentrates

Senate Group Recommends Formation Of Department of Mineral Resources

The Subcommittee on Minerals, Materials and Fuels of the Senate Interior Committee (in its report on the domestic manganese situation) has recommended the creation of a new government agency, the secretary thereof to be of cabinet rank. The agency would be called the United States Department of Mineral Resources.

It may be remembered that during the 83rd Congress Senator James E. Murray of Montana, joined by Senator Mike Mansfield of Montana, introduced such a bill. It was referred to the Committee on Government Operations and promptly buried. Similar bills were introduced in the House, one by Representative Gracie Pfost of Idaho, which also received no attention. The Murray bill, S. 2432, 83d Congress, First Session, would have consolidated in the new agency all the functions of the federal government relating to the coal, oil, metallic and non-metallic industries.

At present there are some 57 bodies dealing with these matters. In the interest of better organization and economy, it is surprising the Hoover Commission did not come up with a similar recommendation.

Senator Murray remarked at the time S. 2432 was introduced, "It was neither deliberate nor an oversight that such an agency was not created when our government was originally organized. As is well known, a mineral industry at that time was practically non-existent and there was no apparent reason for it. In the ensuing years, however, these industries, each starting in a small way, have grown to such mammoth proportions that our economy basically depends on them. They no longer should be represented in the government by an agency concerned principally with electric power, irrigation, public lands and Indians."

The last sentence of the new report states: "It would appear the part of wisdom that the Congress create a United States Department of Mineral Resources, with the head thereof having cabinet rank, and transfer to it the functions of all bureaus and agencies having to do with minerals." Therefore, it may be guessed that legislation to this purpose may be introduced in the next session of Congress. While there has been considerable talk concerning the desirability of such a department, the first concrete move in that direction was the Murray-Mansfield-Pfost bill and it was surprising that the measure did not gain more active industry support.

• DMEA's Work Is Endorsed

After the government purchase programs are ended —and even now, in some cases—what to do with the ores you have found will present quite a problem. Therefore, it is heartening to note that Professor Flemming, director, Office of Defense Mobilization, has endorsed the work of DMEA and has indicated he will approve its continuation.

We always have been complimentary to the Defense Minerals Exploration Administration although at one time we criticized severely some of the policies originally laid down for it by its parent organization, the old Defense Minerals Administration. While some of the objectionable basic policies have not been changed, time has ironed out many of the bugs in the functioning of the organization, even though it must depend upon the Bureau of Mines and the U. S. Geological Survey for its field work. DMEA, under the capable direction of C. O. Mittendorf and his competent assistants, has turned out to be about the smoothest running and most sensible bureau in the government.

• New ODM Assistant Director For Materials

Another ODM assistant director for materials has come and gone. William S. Floyd has been replaced by Frank G. Ogden, purchasing agent for the Detroit Edison Company. Mr. Floyd was purchasing agent for the Shell Oil Company. The prior incumbent was purchasing agent for the Union Oil Company. All were, or are, members of the National Association of Purchasing Agents. The General Services Administration is the purchasing agent for the government, not the Office of Defense Mobilization, which is a policy making organization, dealing largely with metals, minerals, stockpiling and mining. What does a member of the National Association of Purchasing Agents have on the ball that a good mining engineer or executive of a mining company doesn't have?

• Government Suspends Aid to Titanium

The middle of September Arthur S. Flemming, director of Defense Mobilization, suspended the program of government assistance for the creation of additional titanium sponge capacity. He took this action after reviewing a report submitted by his special consultant, Harold S. Vance, and consulting with the Defense Mobilization Board, the National Academy of Sciences, and ODM's Titanium Advisory Committee.

Mr. Flemming also accepted three additional DMB recommendations which are in harmony with the Vance report. These provide that: (1) General Services Administration should include Brinnell hardness specifications which will achieve higher quality and greater uniformity of titanium sponge in the event of future purchase contracts; (2) GSA should, so far as is practical, hold purchases of sponge to a minimum consistent with continuing developments of a better product and with the maintenance of production facilities; and (3) the Department of Defense should make every effort to expand the use of titanium in military equipment on a production basis despite its present high cost.

THERE'S A COAST SAFETY FUSE
FOR EVERY BLASTING OPERATION

TRIPLE TAPE . . . for very wet work, rough handling
BEAR . . . for wet work; is white countered
SEQUOIA BLACK . . . for warm climate, heavy water pressure
SEQUOIA WHITE . . . hot climate, inflammable explosives, heavy water pressure
DREADNAUGHT . . . wet work, cool climate
BLUE LABEL . . . dry or damp agricultural and quarry work

REMEMBER COAST'S SPITTERCORD

PRIMACORD · BICKFORD
Hot Wire Fuse Lighters
Detonating Fuse
Safety Fuse
Celokap

COAST MANUFACTURING & SUPPLY COMPANY
ESTABLISHED 1867
LIVERMORE, CAL.

Ask your powder supplier or write for literature

COAST MANUFACTURING & SUPPLY CO.
LIVERMORE, CALIFORNIA

Over
Half Century
Experience in

Exploration and Development
Diamond Core Drilling
Grouting
Rock Breaking
Mining—Quarrying
and Tunnel Driving

Full details on request

Bovles Bros.
DRILLING COMPANY

1321 South Main St. • Dial HUnter 4-4401
Salt Lake City, Utah

Branch Offices:
Colville, Washington — Telephone 181
Leadville, Colorado — Telephone 526
Phoenix, Arizona — Telephone CRestwood 4-5331
Montezuma, Utah — Telephone 2881 and 9184

• Manganese Beneficiation Plants Needed

A report by the Senate Interior Subcommittee on Minerals and Fuels recommends that beneficiation plants to process domestic low-grade manganese ores be built as soon as possible, and that government purchase of manganese ores at adequate prices be continued so that the nation may have a "realistic" mobilization base program.

The report is the result of hearings held last April and an intensive study of the manganese program. It was prepared under the direction of Senator James Murray of Montana, chairman of the Senate Committee on Interior and Insular Affairs.

The charge is made that the government has been "dragging its feet" on the manganese program and, as a result, the impression has been created that our widespread low-grade manganese deposits are not worth developing. Actually, the report states, the processes are available, and a realistic pilot-plant program should be started immediately.

The committee therefore recommends that beneficiation plants be built in peacetime, and also that the end products, such as electro-manganese and ferro-manganese, be placed on the critical materials list and be stockpiled.

Another committee recommendation says that, in view of the "dilatory" handling of the manganese program, the time has come for Congress to examine the over-all minerals situation and to consider the creation of a Department of Mineral Resources in the executive branch so as to give the mineral industry the recognition it needs and which cabinet status would provide.

• Barter Proposal Made For Copper

Representative James T. Patterson of Connecticut, always an ardent advocate of no-tariff copper, has come up with a new scheme to alleviate the copper shortage at the fabrication plants. Representative Patterson proposes to swap surplus agricultural products for foreign copper—especially in Chile.

We want to get rid of surplus agricultural products —and at the present time increased copper imports would not hurt the mining industry and would help the fabricators. At this writing the "official" price of copper is 43 cents per pound, custom smelters are selling at 50 cents per pound (which probably is what the traffic would bear at the moment), and the London price is a fraction over 53 cents per pound.

The Commodity Credit Corporation has the necessary authority to barter for copper and other minerals. But for some reason copper is not on its list, so Representative Patterson has asked the President to issue a directive. He figures the principal source of the bartered copper would be Chile. As the vast bulk of Chilean copper is American produced, we presume the "independent" copper is what the Congressman is shooting at.

COMING CONVENTIONS

November 7, 8. Western Governors' MINERAL POLICIES CONFERENCE, Sacramento, California.
November 8 through 11, 1955, Annual Meeting AMERICAN COUNCIL OF INDEPENDENT LABORATORIES, INC. Westward Ho Hotel, Phoenix, Arizona.
December 2, and 3, 1955. NORTHWEST MINING ASSOCIATION's annual convention. Davenport Hotel, Spokane, Washington.
December 10 through 16. NUCLEAR CONGRESS and ATOMIC EXPOSITION, Public Auditorium, Cleveland, Ohio.
February 2, 3, and 4, 1956. NATIONAL WESTERN MINING CONFERENCE, sponsored by the Colorado Mining Association and affiliated groups. Shirley Savoy Hotel, Denver, Colorado.

Mining World

THE IMPORTANT MINING MAGAZINE EVERYWHERE

November 1955

INTERNATIONAL PANORAMA

JOHANNESBURG, SOUTH AFRICA—The Weedon interests have sold their manganese concession in Northern Rhodesia to Vanadium Corporation of America. The new property will be called Bahati Mines, and will be operated by Rhodesian Vanadium Corporation.

SANTIAGO, CHILE—Anaconda Company expects to reopen its Africana copper-mine, and reportedly has started building a reduction plant. Production is expected in about a year, at a rate of about 8,000,000 to 9,000,000 pounds annually.

ZAMBALES PROVINCE, PHILIPPINE ISLANDS—Surigao Consolidated Mining Company will explore and develop a group of copper claims owned by Ancheta Mining Company. The property is known more for its enormous chrome deposits.

GUADALCANAL, BRITISH SOLOMON ISLANDS—A gold-bearing ore body has been found on Gold Ridge, bringing to four, the number of the gold-bearing ore bodies located this year on the ridge by the geological survey.

THE DALLES, OREGON—Harvey Machine Company will build a $65,000,000 aluminum reduction plant early next year. Annual capacity will be 108,000,000 pounds.

SOUTHPORT, AUSTRALIA—National Lead Company has formed a new Australian subsidiary, Mineral Deposits Pty. Ltd. with a mine and plant in Southport. The company will mine, process, and export rutile and ilmenite.

GRAND JUNCTION, COLORADO—Minerals Engineering Company is exploring for mercury in northern Nevada. Arrangements are being made to custom furnace any ore found suitable.

GREENEVILLE, TENNESSEE—International Minerals & Chemical Corporation has begun construction of a mica plant which will reclaim mica from silt. Initial capacity will be about 100 tons a day.

FAIRBANKS, ALASKA—Four local prospectors report that they have found uranium on Seward Peninsula, about 180 miles northeast of Nome.

MADRID, SPAIN—Installation of a quicksilver distillation plant in Castaras, province of Granada, has been authorized by the Director General of Mines. The plant will have two distillation furnaces of Spanish design and construction, with operation scheduled for the end of 1956.

ORANGE FREE STATE, UNION OF SOUTH AFRICA—Trial milling has started at the Free State Geduld Mines Ltd. and the mine should be in full production shortly.

JOS, NIGERIA—Kennecott Copper Corporation has purchased a 52 percent interest in Tin & Associated Minerals, Ltd. of Nigeria, owner of a columbium mine and concentrating plant.

TUCSON, ARIZONA—Lewisohn Copper Corporation has been formed to mine and concentrate copper on 46 patented lode mining claims in the Helvetia district.

MANILA, PHILIPPINE ISLANDS—Discovery of 29,000,000 metric tons of iron deposits containing 1.38 percent nickel ore in the Surigao iron ore reservation on Nonoc Island has been announced.

KELLOGG, IDAHO—Bunker Hill & Sullivan Mining & Concentrating Company plans to buy Hecla Mining Company's 50 percent interest in Sullivan Mining Company, thereby giving Bunker Hill complete ownership, and also proposes to purchase 36 percent interest in Pend Oreille Mines and Metals. In return Hecla would acquire 17 percent interest in Bunker Hill.

PERTH, AUSTRALIA—Diamond drilling at the Hill 50 Mine N. L. gold mine has confirmed high-grade ore to a depth of 1,300 feet, 240 feet below the deepest mine opening.

CARLSBAD, NEW MEXICO—The United States Potash Company will begin a 20 percent capacity expansion at its mine and refineries east of here.

West Rand Sets World Shaft Sinking Record

West Rand Consolidated Mines Ltd. established a new world shaft sinking record in September when an advance of 763 feet was made in the Monarch shaft in the Transvaal, Union of South Africa. Previous record had been made by Vaal Reefs Exploration and Mining Company in March 1955 with an advance of 667 feet. (See MINING WORLD, June 1955, page 72.)

The Monarch is a vertical, rectangular unit, 20 by 11½ feet, with three compartments. It will be sunk to a depth of 3,500 feet to serve the western section of the Bird Reef horizon, at an estimated cost of £505,000.

In August the firm had come within one foot of equaling Vaal Reefs' record for all types of shafts (Vaal Reefs is a circular shaft), and had set a record for rectangular shafts.

Simplot Will Reopen Nevada Iron Operations

The J. R. Simplot Company is reopening its iron mining operations in Eureka County, Nevada for exports to Japan. The firm expects to ship about 2,000 tons of ore daily from the Modarelli deposit near Paradise from which it shipped over 300,000 tons in 1952. The ore will be sent to Stockton, California where it will be loaded aboard ships. Equipment and personnel from the Gay phosphate mine at Fort Hall, Idaho have been transferred to this Nevada operation. John Kobe is resident manager and Thomas Hughes is superintendent of the mine.

Philippine Central Bank Stabilizes Gold Price

The Central Bank of the Republic of the Philippines is purchasing gold produced in Philippine mines at the rate of Pesos 105 per ounce from marginal mines and Pesos 103 from over-marginal mines. This action is being taken in order to augment the country's international reserves, and only applies during the period from September 1 to December 31 of this year.

The Central Bank will take the total output of local producers at these figures, but in any case, producers will be required to sell half of their production to the Bank, though they will be free to dispose of the rest in the free market if they so desire.

Producers are urging a government subsidy price of Pesos 110 which, they say, is necessary in order to operate profitably.

THIS TRACTOR MOUNTED DRILLING UNIT with a compressor is used to bore 2⅝-inch blast holes in the open pit. Twin drills mounted on hydraulic booms feed 16-foot steel lengths into the phosphate cap rock.

Montana Phosphate Starts Open Pit To Mine Thin Ore Bed on 24° Slope

Following on the heels of an intensive five-year study, Montana Phosphate Products Company has laid out an approximate $2,000,000 program designed to cut production costs at its Anderson mine, 10 miles northwest of Garrison, Montana. The double-barreled plan includes a new open-pit project in which a 3½- to 5-foot-thick, phosphate-bearing bed will be sliced off the flank of the Garrison anticline. The factor which makes this operation so unique is that the structure in the area outlined for open pitting dips at approximately 25° which roughly parallels the slope of the surface topography. The cut will advance up-dip in a surface slope-mining method.

The second phase of the program will be a two-mile-long, low-level, haulage tunnel on the 4600 level which will eliminate shaft hoisting requirements at the existing underground installation. The site for the portal of the adit has been cleared and actual work will begin later this year on completion of a compressor building and a change house. Geared to the proposed tunnel is a recently completed 4.7-mile rail line linking the portal site with the Northern Pacific Railroad. The underground operations of Montana Phosphate Products will be covered in a later feature.

Operates Three Mines

The phosphate rock produced at the Anderson mine, as well as other mines in the vicinity, is used for making fertilizers. Sulphuric acid, a byproduct from the metallurgical operations of The Consolidated Mining and Smelting Company of Canada Limited (Cominco), is reacted with the phosphate rock in processes at the Trail and Kimberley, British Columbia chemical fertilizer plants of the Canadian company. To meet fertilizer requirements, a high-grade source of ore is necessary—one containing better than 30 percent P_2O_5.

A point of interest lies in the fact that two-thirds of the phosphorus in the phosphate rock shipped to Canada for processing is returned to the United States as finished fertilizer to be purchased by farmers. Much of the remainder is bought by Canada's prairie grain growers.

Montana Phosphate Products

The company operates three mines and has numerous holdings in the area. The deposits occur in a single bed in the Phosphoria formation which has been warped into a series of broad, interrelated folds. The Anderson mine is located on the southwestern flank of a northwesterly trending anticline. The Luke and Gravely mines are lo-

cated to the east of the Anderson, the total distance separating the Anderson and the Gravely being about 7 miles. The Luke is on the opposite limb of the Garrison anticline, and the Gravely (east of the Luke) on the complementing limb.

Geology

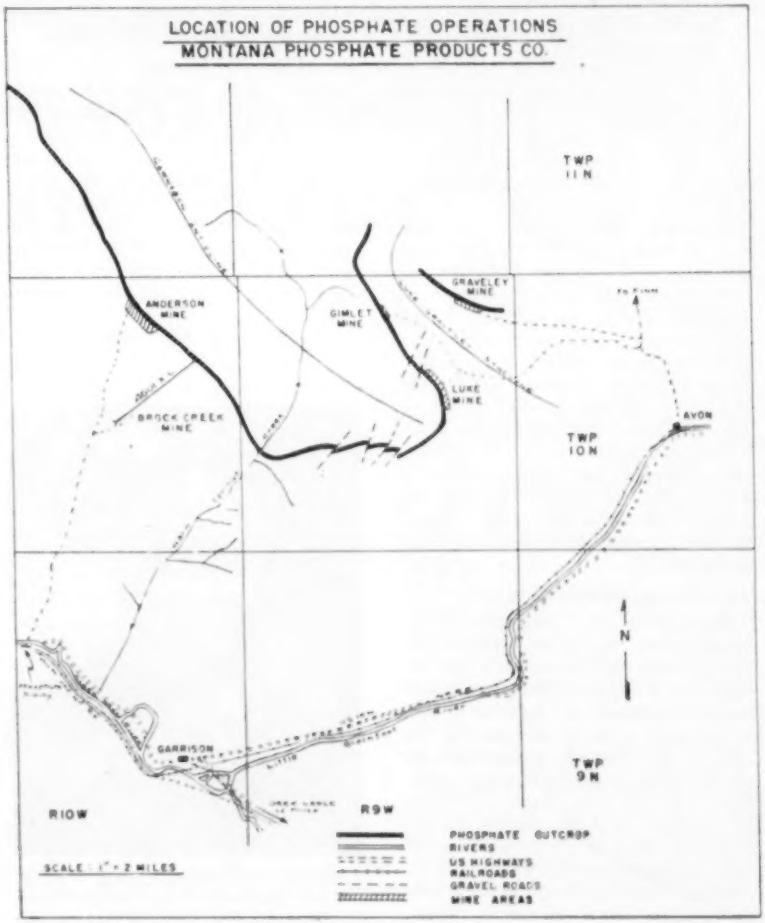
The Phosphoria formation is made up of three units. At the bottom is a 20-foot zone of silty rocks which becomes more cherty toward the top. This forms the footwall of the 3- to 5-foot-thick phosphate bed which is well marked by clay partings on the top and bottom. The hanging wall is composed of a cherty quartzite which varies from 8 to 40 feet thick.

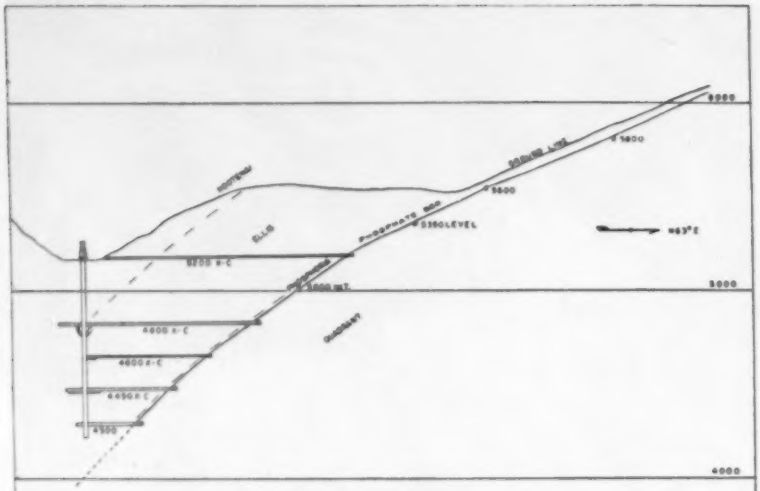
The oolitic texture of the phosphate is distinct, and individual grains are composed, in large part, of collophane ($Ca_3(PO_4)_2H_2O$) with minor amounts of francolite and dahlite. Quartz occurs interstitially in the matrix and as grains in the oolites. The continuity of the beds is interrupted by scattered breccia zones, locally termed "wash." The folds strike northwest and plunge to the southeast. Thus, the Garrison anticline forms a closure on the southeastern end. Cross faulting is common, especially on the nose of the anticlinal closure and to the northeast of the Anderson mine. The throw is generally normal, and the displacement of the phosphate bed generally is 2 to 6 feet. These deposits are somewhat unique in that there is an absence of calcite and other related carbonates in, or associated with, the beds. The phosphate bed dips 25° to 30° generally, although in the anticline the dip is gentler near the crest and steepens with depth.

Pit Now Producing

Preliminary surface work, such as clearing timber and providing access roads, began June 13 of this year under contract. Utah Construction Company will strip and mine an area between the 5,600- and the 6,000-foot elevation, under contract, where the flank of the Garrison anticline generally parallels the slope of the surrounding hills. The phosphate-bearing member of the Phosphoria formation at this point is covered by only 16 feet of capping. The general method of attack will be somewhat novel, since no benches will be established because of the thin nature of the deposit. Instead, Utah Construction will start at the lower elevation, establish one face and advance up the 24° slope, removing ore and waste separately. Waste will be bulldozed to fill cuts previously mined down the slope, and ore will be hauled over a road with a maximum 10 percent grade to the loading area on the Northern Pacific

INSPECTING PHOSPHATE ROCK in the new pit is Sherman Hellerud (left) who is job superintendent for Utah Construction Company as the open pit project. A. E. Langston (right) is mine superintendent of Montana Phosphate Products Company.





tracks. Eventual production is expected to reach 600 tons per day.

Cat-Mounted Drill Unit

Sherman Hellerud is superintendent of the operation for Utah Construction Company. He first began work on the 10 percent access road in June and up to the first of August had excavated about 53,000 tons of ore and capping. For drilling blast holes he is using the Caterpillar tractor-mounted Gardner Denver percussion drill and compressor assembly which is proving quite adaptable for small pits and quarries. Two four-inch drill machines with 16-foot feed shells mounted on hydraulic booms are installed on the front end of the tractor. A 600-cubic-foot-per-minute compressor is mounted on a reinforced platform behind the operator's seat and driven by a power take-off from the souped-up 145-horsepower engine in the D-8 Caterpillar chassis. The unit provides a highly efficient mobile drilling rig which is ideal for the work involved at the Montana Phosphate Products open pit.

Three Faces Now Worked

Because of the topography of the surface overlying the ore deposit, Utah Construction has necessarily had to start three separate working faces—two at an apparent higher elevation in drainage gulches and one on the crest of hill. Actually, these faces are all at approximately the same elevation, but each was started according to the local relief to intersect the ore along the same structure contour. As work progresses the three faces will be widened until they join, and one single slice will be carried up the 24° slope. The 16-foot-thick section of capping overlying the ore will be used as backfilling for the cuts made in the hill and will provide the working platform for the drill rigs, shovels, and trucks.

Break to Old Stopes

Open stope underground mining practices had been carried on up the dip of the phosphate bed, leaving 12-foot pillars between 60-foot-wide stopes to a point marking the lower edge of the new pit. Since these stopes were quite wide, a considerable mined out area bounded the lower pit limits, and caution had to be exercised at the outset of surface operations.

In each of the three working areas now established, the practice was to break into the old stopes at a point near their upper limit to make a working face. This method provided a tailored breast from which stripping and mining could be started.

F. E. BURNET, superintendent of mines, oversees operations at the Graveley, Gimlet and Luke mines.

The crawler-mounted drill rig can be switched from face to face to suit prevailing working conditions. The blast holes are bored with 2⅛-inch carbide bits and steel 16 feet long—the mobile drill rig working at the breast. In other words, holes paralleling the rock formation rather than vertical holes are used to break the rock. The capping or hanging wall of the phosphate bed is a cherty quartzite which is very hard and abrasive. The blast holes are loaded with 2- by 16-inch cartridges of 40 percent strength dynamite. Each face will advance in step fashion up the slope backfilling the mined area with waste.

Mining Cycle

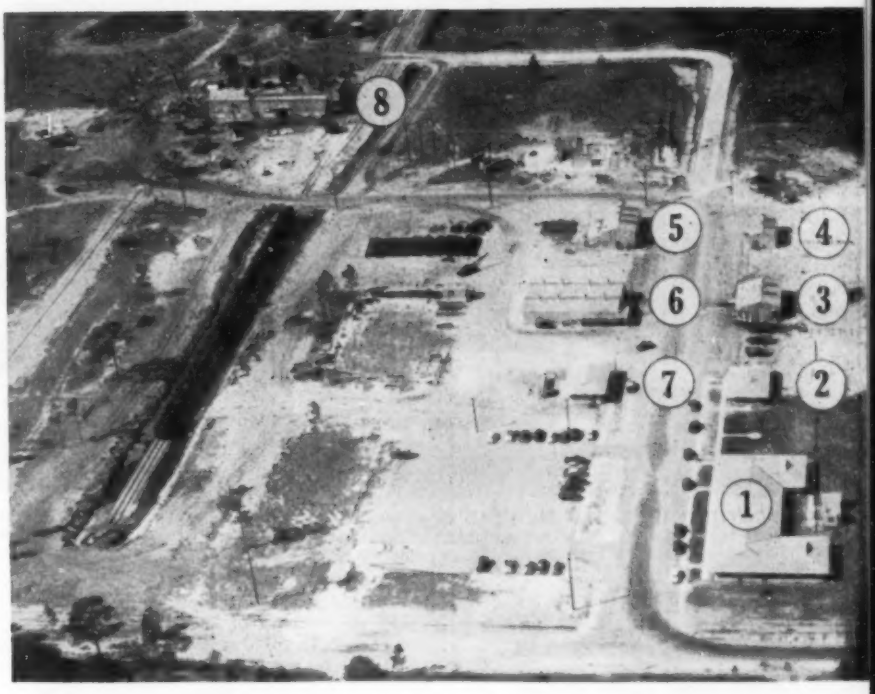
For handling broken rock Sherman Hellerud has at his disposal one P&H 1055 which carries a 3-yard bucket, and one Bucyrus Erie 54-B which he uses for loading ore. The model 54-B has a 2½-yard bucket. The larger shovel which is used for handling the capping is unique in that it has an exceptionally long boom (48 feet) for a shovel of its size. This makes the unit quite adaptable for miscellaneous crane duty in conjunction with shop facilities now being constructed by Utah Construction adjacent to the open pit.

With the three working areas now prepared, the superintendent is in a position to follow a regular stripping and mining cycle in each place. As mentioned previously, ore and waste are broken separately, so capping is handled in one area; ore is loaded in a second face, while the third breast is being drilled. Thus, a continuous production of phosphate rock can be maintained simultaneously with stripping and mining.

Ore Must Be Swept

To make fertilizer, the ore should average 31.5 percent P_2O_5 or better. The deposit at the Anderson mine will average about that figure so every precaution is taken to minimize dilution. Utah Construction Company has rigged a Reese, rubber-tired loader with a broom attachment to sweep the exposed ore after the capping has been blasted away. The life of the operation will be approximately five years, and eventually production will amount to 600 tons per day.

MINING WORLD wishes to thank officials of both Montana Phosphate Products Company and Utah Construction Company for permission to write the article.



PANORAMIC VIEW of the Highland Plant shows (1) Engineering and General Offices; (2) Laboratory; (3) Garage; (4) Electric Shop; (5) Welding Shop; (6) Warehouse; (7) Change House and (8) Dry Mill.

How Humphreys Separates Titanium Minerals At New Highland Plant

The growing need for titanium dioxide pigments and titanium metal has created a larger demand for titanium minerals. E. I. du Pont de Nemours and Company is one of the largest domestic producers of both pigment and metal and has expanded production of both. To meet the increased needs for titanium minerals, du Pont has operated a 100,000 annual ton titanium concentrate plant per year at Trail Ridge, near Starke, Florida, since 1948. In April 1955, the new Highland plant, jointly designed by du Pont and the Humphreys Gold Corporation, and operated by Humphreys under a management contract with du Pont, went into operation.

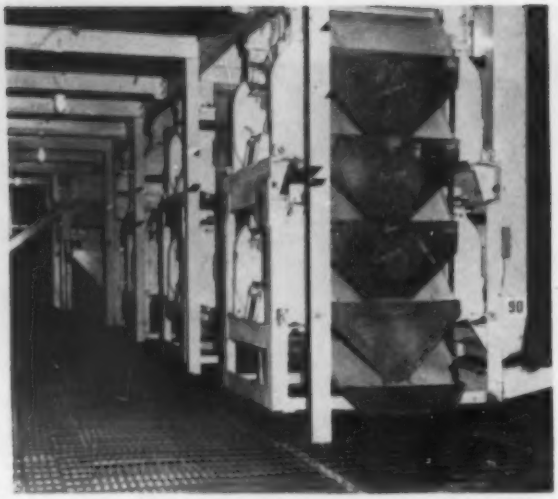
The October 1955 issue of MINING WORLD outlined the mining of the ilmenite-bearing sands with a suction dredge, and heavy mineral concentration by Humphreys spirals mounted on a floating barge. The spiral concentrate is pumped ashore from the floating barge for final concentration in the dry mill.

The dry mill is the final step in the recovery of the ilmenite and the associated minerals. The concentrate is first dewatered in an Akins spiral classifier with a 48-inch screw. The sands are then conditioned in a caustic bath, washed, and dewatered again in a second spiral classifier.

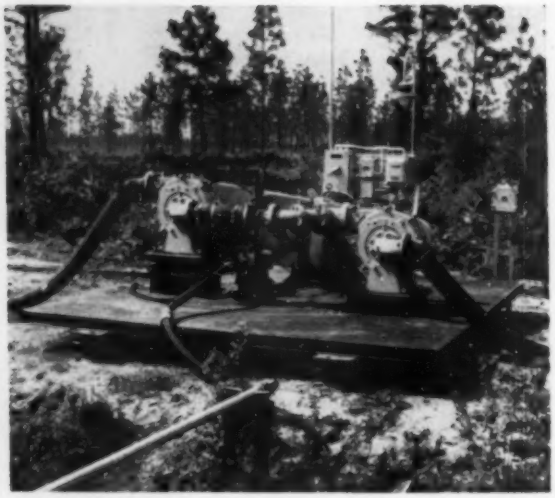
A stacking and weighing belt stockpiles the concentrate on an open bed. A Link-Belt Speeder clamshell transfers the material from the stockpile to the ore bin. From the bin the concentrate is conveyed to an 8- by 65-foot Hardinge (Ruggles-Cole type) oil-fired dryer, which raises the temperature of the concentrate to 225° F. at discharge. The sands are next screened and carried to the rougher feed bins by bucket elevators.

The sands are concentrated and separated by two methods: The first of these methods is by use of Carpco Industrial high tension separators. There are three groups of these separators for roughing, scavenging, and cleaning. In the rougher section there are seven units, four in the scavenger section, and three in the cleaner section. Each high tension separator unit consists of four horizontal rotors, equally spaced and parallel to each other. The rotors are six inches in diameter and five feet long. Parallel to each rotor, and extending for the entire rotor length, is a beam-type electrode.

Essentially, a beam electrode consists of a large diameter electrode which has a non-discharging field and a fine wire (0.010-inch in diameter, or less) which tends to discharge readily. The wire is supported between two posts attached to each end of the electrode, and is in electrical contact with the electrode. The combination of the electrode and the wire creates a very strong discharge pattern which



FINISHED ILMENITE PRODUCT is recovered from these four high intensity magnetic separators. Ilmenite concentrate is made into titanium dioxide for paint pigments.



ONE OF FIVE booster pump stations used to pump concentrate from the wet mill to the dry mill. Vegetation in background is typical of that which must be cleared before dredging.

is focused to a narrow arc and beamed at the rotor.

Principle of High Tension

The principle of high tension separation is based on the degree of susceptibility of the mineral particles to assume a surface charge when they are sprayed by a high voltage discharge from the beamed electrode to a grounded rotor. Particles of relatively poor conductivity will assume a charge and will be attracted and pinned to the rotor. This is known as "the pinning effect."

Particles which have a relatively high conductivity will not assume a charge easily (the little charge they may receive readily leaks off to the grounded rotor). These particles leave the rotor in a flight path very similar to the one they would have without a charging effect.

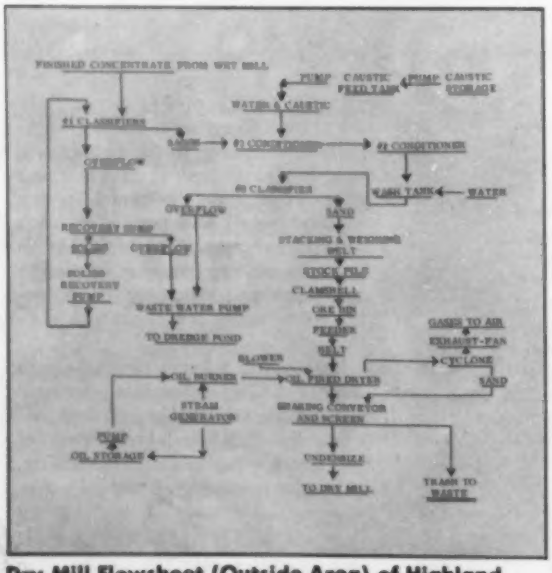
The polarity of the charging electrode is of little or no consequence as the particles receive a charge that is necessarily opposite to the rotor's charge. This separation is not static by nature, as some flow of current must exist.

In an electrostatic separation, charged particles are conveyed into a charged field and are attracted to an electrode of the opposite charge or repelled from an electrode of like charge. The attraction of a charged particle toward an electrode of opposite charge is called the "lifting effect."

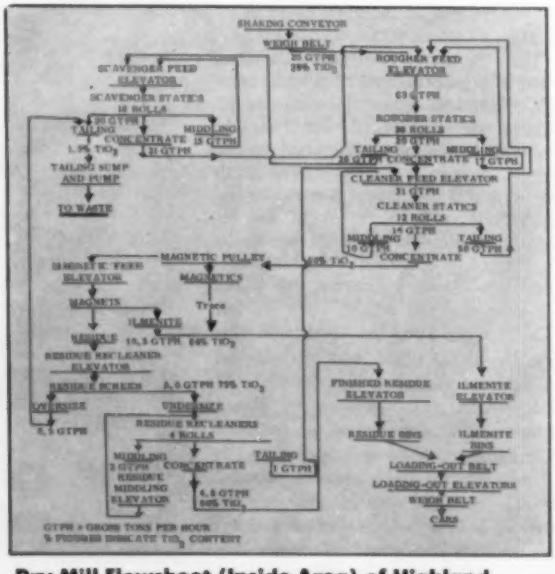
A "lifting effect" can be created in high tension separators by rotating the electrode so the high voltage discharge is beamed away from the rotor. This cancels the "pinning effect" and creates a "lifting effect."

High Tension Operation

In actual operation at the mill, the sands are fed to the rolls from a hop-



Dry Mill Flowsheet (Outside Area) of Highland Titanium Mineral Plant Lawtey, Florida



Dry Mill Flowsheet (Inside Area) of Highland Titanium Mineral Plant Lawtey, Florida

per. A slot orifice uniformly distributes the material in a thin layer over the rolls at an angle of 60°. The beam electrode is positioned so the sands pass through the high voltage (40,000 volts) discharge beam or arc.

Because of the positioning of the electrode there is a strong "pinning effect" and some "lifting effect." The ore particles containing titanium—ilmenite, leucoxene, and rutile—have a relatively high electrical conductivity and leave the rotor in a normal path. The remaining minerals—staurolite, zircon, kyanite, sillimanite, and other silicates—are readily charged and pinned to the rotor.

The stream of sands leaving the rotor contains entrapped particles of both the conductor and non-conductor material. A further separation is made in the stream because of the "lifting effect" or attraction of the non-conductors for the large diameter electrode. Splitters are placed in the stream which gives concentrates, tailings, and a circulating load.

The silicates that are pinned to the rotor are removed by a fixed brush. They are then sent to the scavenger rolls for further concentration.

Magnetic Separation

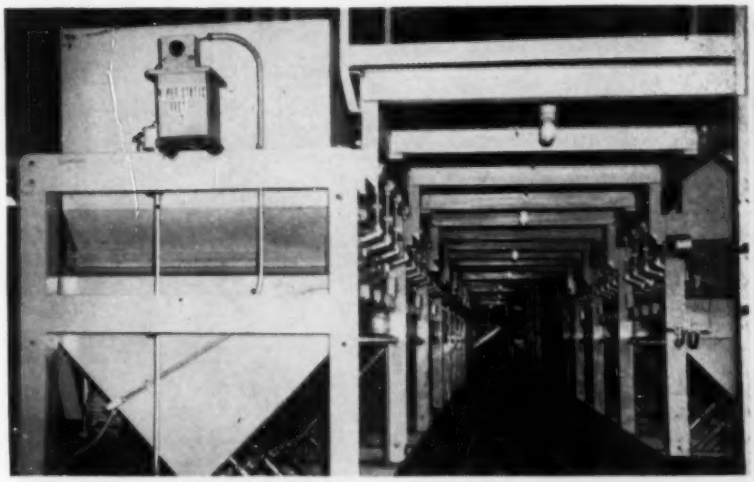
After the third stage of high tension separation (cleaner rolls), the concentrates are further separated by high intensity magnetic separation. This is the second major method used at the Highland Plant.

The concentrate consists of a mixture of ilmenite and non-magnetic titanium minerals. A final separation is accomplished in four Stearns magnetic separators. Ilmenite is pinned to the magnetic rolls and is brushed off and collected in the ilmenite bin. This is the finished ilmenite product.

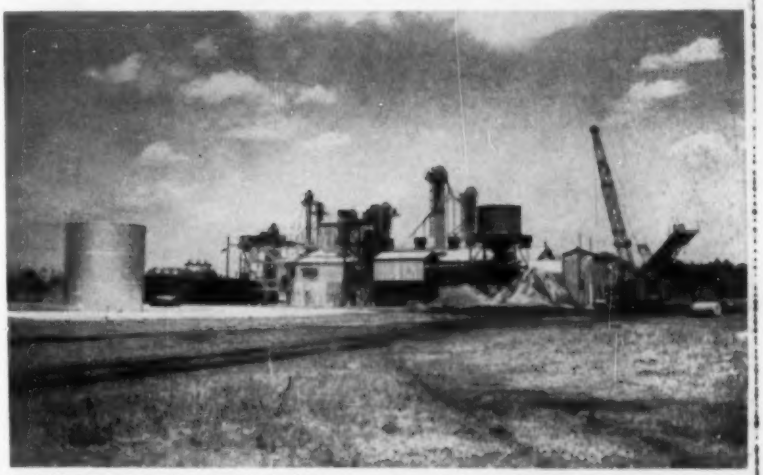
The non-magnetic residue is screened and recleaned on four high tension separator rolls called residue cleaners. Concentrate from the residue cleaners goes to the residue bin and is the second finished product. Tailing is re-circulated.

The plant is designed to produce 100,000 tons of titanium mineral concentrate per year. Concentrate is shipped in hopper bottom covered cars to E. I. du Pont de Nemours and Co., Inc.'s Edgemoor, Delaware and Baltimore, Maryland, plants for the manufacture of titanium dioxide pigment, and titanium metal.

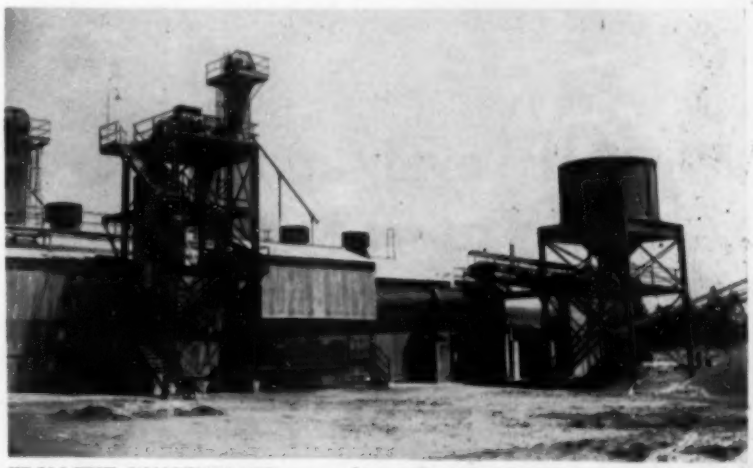
E. C. Weichel is manager of both the Highland and Trail Ridge plants. E. S. Beebe is Highland plant superintendent, and L. W. Mathews is Highland production manager.



TWO BANKS OF HIGH TENSION separators are shown here. Particles are separated according to their relative susceptibility to assume a surface charge when sprayed by a high voltage discharge from the beamed electrode.



HERE AT THE DRY MILL final concentration of the titanium ore minerals is made. At the left is the caustic storage tank, the towers house bucket elevators, and at the far right is the stacker-crane used to load the concentrate bin.



FROM THE CONCENTRATE storage bin at the right, the sands are dried in an 8- by 65-foot oil-fired dryer. Dried concentrate is then screened and carried to the rougher feed bins by bucket elevators.

DRILLING OUT DRIFT ROUND with RH 655W Atlas pneumatic pusher leg drills. This drift miner alternates between two or three drifts so as to always have a clean face to drill. From 25 to 30 2.1 meter deep holes are drilled for each round.

Why Sub Level Caving Proves Successful at Grängesberg

- ***Hanging Wall Pressure Helps To Break Ore***
- ***There Is Almost Complete Ore Extraction***
- ***Output Per Man Shift Is High With Low Powder Use***

By BROR-KNUT LUNDIN

Mechanical sub-level caving of hard magnetite iron ore has reached a high degree of efficiency at the Grangesberg mine in central Sweden. The mine is owned and operated by Trafikaktiebolaget Grängesberg-Oxelösund, T. G. O. The most important ore body is called the "Exportfältet" because the company mines the ore, ships it over its own 250-kilometer-long railroad, and exports it from the ice-free Baltic Sea port of Oxelösund.

The main ore zone consists of four interlocking deposits with widths from a few to 95 meters and extends for an extreme length of 1,500 meters. The ore is magnetite; it assays from 58 to 60 percent iron, but is high in phosphorus—averaging 1.0 percent. The ore bodies dip 65 to 70°, and are cut by a series of post-ore pegmatites and amphibolites. A series of highly irregular tongues and lenses of granite also cut and are surrounded by the ore. This granite is important in planning mining operations because it represents as much as 24.5 percent of the ore zone area between the hanging and foot walls in certain levels of the mine.

Early operations were by open-cut mining to 70 meters below the surface in the southern section and 110 in the northern section of the Exportfältet. This was followed by underground mining using transverse shrinkage stoping to 150 meters below the surface. The low strength of the hanging wall resulted in difficulties, however, and about 1910 it was decided to change mining to sub-level caving. This method was first employed for extracting the pillars between the stopes. It proved successful and still is the principal method of mining.

Advances In Equipment

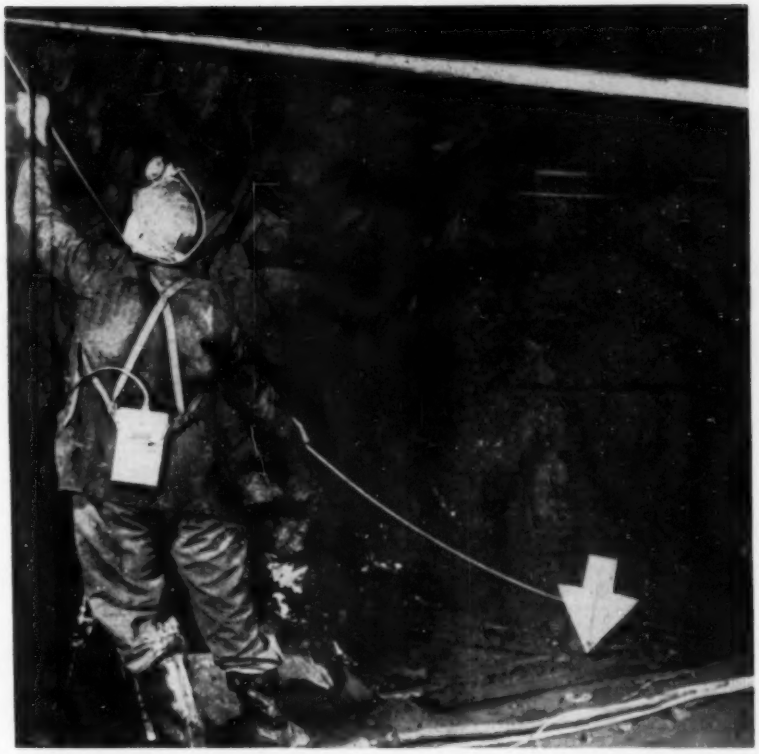
During the years the method has kept pace with the improvements in mining technique and modifications have passed through a number of stages. The early column rock drills have been replaced by modern rock drills (pneumatic pushers and rotary stopers). Round drill steel with a low carbon content has been supplemented by hexagonal and flat-bar tungsten carbide-tipped steels. In both drifting and stoping, the ore was originally loaded by hand. At a fairly early date, however, a change was made in stoping whereby the rock was discharged into cars from a simple built-in chute which was gradually moved backward in step with the blasting of roof and pillars.

Mr. Lundin is Underground Manager at Grangesberg mine, Sweden.

The present application of this method, now called mechanical sublevel caving, is the result of a development which started in 1944, when the driving of slice crosscuts was begun in a new manner.

The principles of mechanical sublevel caving are shown in Figure No. I. The raises driven in the footwall between the main haulage levels which are parallel to the strike, serve as manways and ore passages. A couple of raises are the natural starting and finishing points for the mining of a definite section of the ore. On the slice levels, crosscuts are driven from the drift along the footwall to the hanging wall leaving pillars at intervals of four meters. The crosscuts on a slice level are driven so that they come right under the pillars on the level above, see Figure No. II. Their size is 1.9 meters wide by 2.2 meters high above the upper edge of the rails. From 25 to 30 holes all 2.1 meters in depth, and all parallel to the direction of the drift are drilled. The round is blasted by the seam or burn cut method, and the advance amounts to 1.9 meters. Normally, each drift miner requires at least two, preferably three, drifts to avoid being hindered by the loading work. A drift round breaks 35 to 40 tons of rock. Therefore a mucking machine serves two or three drift miners. Drilling is done with RH-655W Atlas drills with pneumatic pushers having a 1.3 meter feed length. These are the same drills that are sold in North America by Copco Eastern, Copco Pacific, and Canadian Copco. Steel is ⅝-inch hexagonal tungsten carbide-tipped, 0.8, 1.6, and 2.1 meters in length with 108 millimeter collared shanks. The 2.1 meter steel has a bit diameter of 32 millimeters. The explosive used, dynamite containing 29 to 30 percent nitrogylcerine carbon and 4 percent of aluminum, corresponds to dynamite containing 50 percent nitroglycerine. It is in cartridges, 23.5 millimeters in diameter and 320 in length, thus enabling rapid charging and easy packing.

The track is arranged slightly off cen-



FLEXIBLE FLAT-BAR STEEL permits drilling of long holes from small sized underground openings. The arrow points to the ski-like device which is easily moved along the floor of the drift to facilitate drill bar changing.

LOADER DRAW POINT at Grängesberg looks like this to loader operator. The ore passes are driven in footwall so they remain intact after blasting out ore on adjacent crosscuts.

HEAVY, BLOCKY ORE at Grängesberg is loaded into two ton cars. Note the great variation in size of ore (from very fine to large boulders) with no intermediate sizes. The fracturing in pillar behind loader shows why broken ore is blocky.

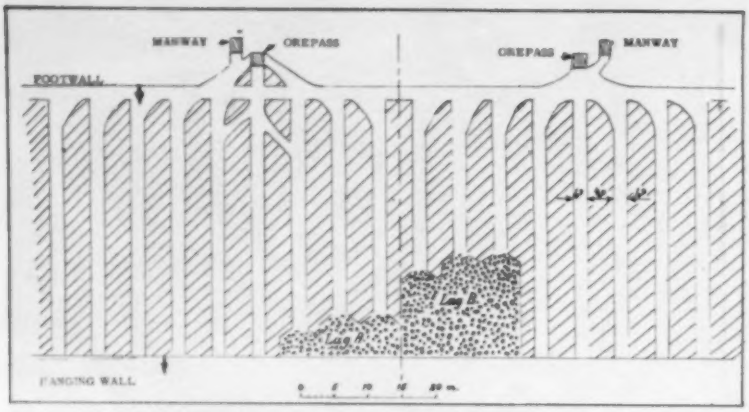


FIGURE NO. 1. Development drifting in chute caving.

ter in the drift to give the loader operator a larger working space. The track has an inclination of 6.7 per 1,000 (1:150) on tangents and 10 per 1,000 (1:100) on curves and in the footwall drift. The laying of the rails is checked with water levels, and switches and curves are also laid with great care. For drift loading, 1.5 and 2.5 meter long track sections are used These consist of two joined rails placed on their sides so that the wheel flanges run on the webs of the rails. Loading is with the same kinds of machines and cars as those used in the sub-level caving. Due to the method of blasting rounds, the broken rock collects at the front of the heading, with little throw, resulting in higher loading efficiency.

Mine From Hanging To Foot

The extraction of a slice is started at the hanging wall. The drift is slapped out (two meters in each pillar), and the roof is excavated, after which the operations retreat toward the footwall. Holes are drilled in rows one meter apart. Each row has seven holes, three roof holes, and two holes in each pillar. They are drilled with RH-656-2MV Atlas rock drills mounted on raising feeds (BMT-62A) having a feed length of one meter. The holes are slightly inclined forward. For drilling the pillar holes and the roof holes to a 2.4 meter depth ¾-inch, hexagon tungsten carbide drill steels, 0.8, 1.6 and 2.4 meters in length, are used. The deep portions of the roof holes are drilled with special flexible steels of 26 by 12 millimeter rectangular cross-section. If they become bent, these steels straighten themselves, leaving no deformation. Like other steels, they are provided with water flushing holes and tungsten carbide bits which have a diameter of 31 millimeters on the first length (3.2 meter) of steel. Only in a few cases have steels over 4.0 meters in length been used. The reason why ordinary steels cannot be used for the entire hole is that it is desired to keep the working face as nearly vertical as possible—particularly for safety reasons—and thus space is not gained in the 2.2 meter high drift for such long drill steels as are required for the roof holes which are normally 3.5 to 4.0 meters deep. Earlier drilling was with carbon steels which were bent before being introduced into the holes, and then straightened. When using flat-bar steels, the rotation chuck of the machine is replaced, but this is done very quickly and is often not necessary because all the holes up to the 2.4 meter depth are drilled in several rows before the roof holes are started. A simple ski-like device which can easily be moved on the floor of the drift facilities the withdrawal of the drill steel from the hole and prevents dirt entering the water flushing holes. It is shown in accompanying picture.

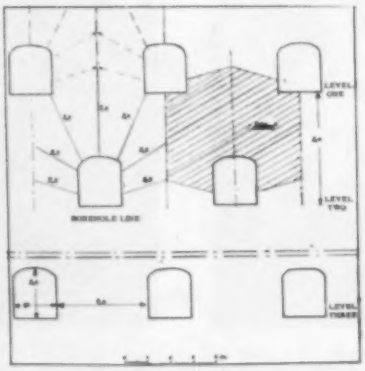


FIGURE NO. 2 Vertical section of a portion of ore.

Three Faces For Mining Crew

Sub-level caving is carried on by teams of three men—a driller who works the dayshift, and two loader operators each working shift. During the morning shift break and when the loader operators change shifts, some loading can also be done by the driller if the drilling work permits. Each team works in at least three cross cuts. The work should be carried on so that the breast is kept parallel with the hanging wall and the distance from this becomes as equal as possible in all of these drifts. (See Figure No. I.) If the roof of a crosscut remains after blasting a row of holes, experience has shown that self-caving is obtained when the operations in an adjacent crosscut reach the corresponding point. The broken rock is mucked with Atlas LM-30 loaders into forward-dumping two-ton cars. The cars are transported to the ore passes by hand.

The vertical distance between the main haulage levels, which earlier was 40 meters, has now been set at 100. At half this distance an intermediate level is driven for communication and transportation of material. On this level larger pipes and cables for compressed air, water, ventilation, and electric current can also be installed making it possible to avoid blocking-up the main haulage level with such installations.

It is important that the ore passes are driven far enough into the footwall, measured from the ore line, so that they remain intact while the blasting out of a level is accomplished. This makes it possible to avoid expensive repairs and it becomes easy to shut off the rock flow from the passes. Water from the slice levels also can be more efficiently prevented from entering the passes. Instead, the water is conducted in cut-off ditches to the manway where it is brought down to the main haulage level in pipes or grooves. If the rock is too wet, both the loading, haulage, and dumping on the main haulage level are made more difficult.

Machines, equipment, and all other material are transported to the slice levels from the main haulage level through the manways.

Many of the problems connected with sub-level caving are closely dependent upon the existing geological conditions. The strength of the ore determines the maximum size of the drifts, pillar thicknesses, and slice heights. It has been found at Grängesberg that, with the present dimensions of drifts and pillars, the slice level of five meters has given an exceptionally good control of the ore breaking operations.

Transverse Mining Is Best

Under present arrangements, only in the footwall drift and in some narrow bodies is the ore still broken along the strike. When working transversely, the hanging wall pressure can be fully utilized. Furthermore, the natural fall of the broken ore against the footwall facilitates a more complete extraction, as there can be no jamming or catching on the footwall. In the case of longitudinal granite intrusions in the ore which follow the general dip, some drilling and loading of granite will be necessary to make it possible to reach the superincumbent ore, but on the other hand the ore will be completely extracted. In order not to break the uniformity of the system, it is necessary to carry on regardless of the granite which results in a reduction in the ore grade. A deviation from the general plan is made only in large or fairly regular granite formations, the position of which can be fairly safely determined in advance. The ore losses when using the present method are very small, perhaps a few percent, but this is partly attained at the expense of reduced ore grade.

Figure No. II shows a longitudinal section of ore comprising three slice levels. It should be observed that the holes shown are not entirely on this level due to the inclination angle. The total meterage per hole row will thus be: in the pillars $2x(2.3 + 2.3)$ and in the roof $3.2 + 3.8 + 3.2 = 19.4$ meters. The distance between the rows is 1.0 meter. As the charging weight is about 0.6 kilogram of dynamite per meter drilled, the consumption of explosives per row will amount to 11.6 kilograms. The volume of ore which is reached from a crosscut is 25.6 cubic meters per meter of hole. (Compare the section lining in Figure No. II.) Grängesberg ores, containing 58 percent Fe, or 50 percent Fe, have a specific gravity of 4.5 and 4.1, respectively. Thus, 115 to 105 tons of ore is theoretically obtained per crosscut meter at the specific gravities mentioned. The output will then be 9.9 to 9.1 tons of ore per kilogram of explosive or 5.9 to 5.4 per meter drilled. When these figures and the conditions on the superincumbent broken slice level are recognized, the work can be more easily supervised so that there will be no unnecessary loading of rock fill. Besides, this control is easy to carry out because the skill of estimating the percentage of ore in a rock blasting operation is quickly acquired. The foremen responsble for this supervision are experienced miners. It should be observed that the figures mentioned are theoretical and, in spite of their apparent accuracy, only attained under ideal conditions.

DUMPING ORE from slice level into an ore pass. Ore is now all hand trammed which is not as efficient as other phases of the mining system. Studies are underway to replace this hand tramming by some form of mechanized transport.

Contract Rates And Results

Driving of slice crosscuts is carried out entirely according to contract rates. In 1954 the capacity was an average of 1.75 meters per man and per 8-hour shift. The consumption of explosive was 10.1 kilograms per meter. Loading is also at per ton rate. The average of loading, outward transport and dumping in ore passes was about 85 tons per man and per 8-hour shift.

In addition to these operations the actual sub-level caving is, as already mentioned, carried out by teams consisting of two loader operators and a driller in each team and is done according to contract rates. The work comprises drilling, charging, blasting, loading, breaking up and blasting of boulders, hand tramming, dumping in ore passes, trimming where necessary, moving of the drilling and loading equipment between the drifts, lubrication, simple machine repairs, and removal of rails as the withdrawal proceeds. The price also includes the explosive. The blasting along the hanging wall constitutes extra expenditure.

In 1954 the output per man per 8-hour shift was 86.1 tons, or per day and a team of three men, about 260 tons. In the same year the amount of rock extracted was 13.2 tons per kilogram of explosive.

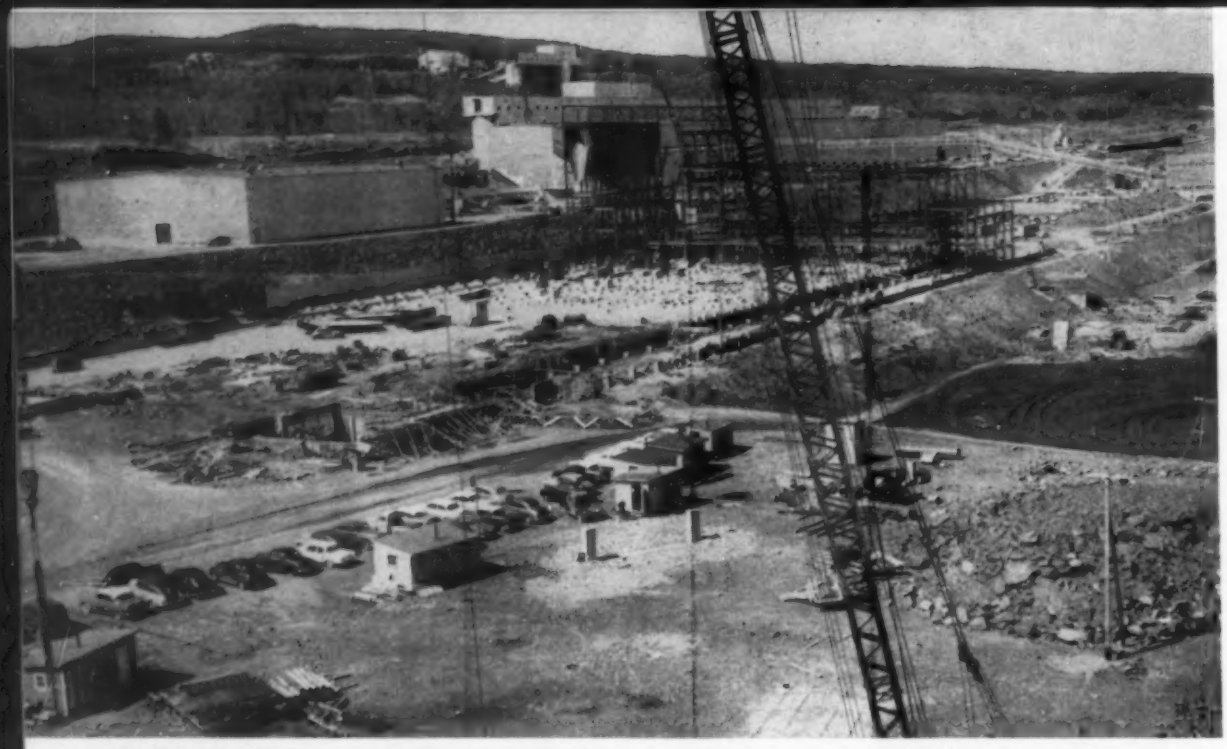
Efficient utilization of the machines is dependent upon prompt upkeep and repair service. At present, one mechanic services 12 loaders. Drilling machines and loaders are repaired locally and for this purpose stocks of spare parts are kept underground. Thorough overhauls are made only in the surface shops.

Transportation Under Study

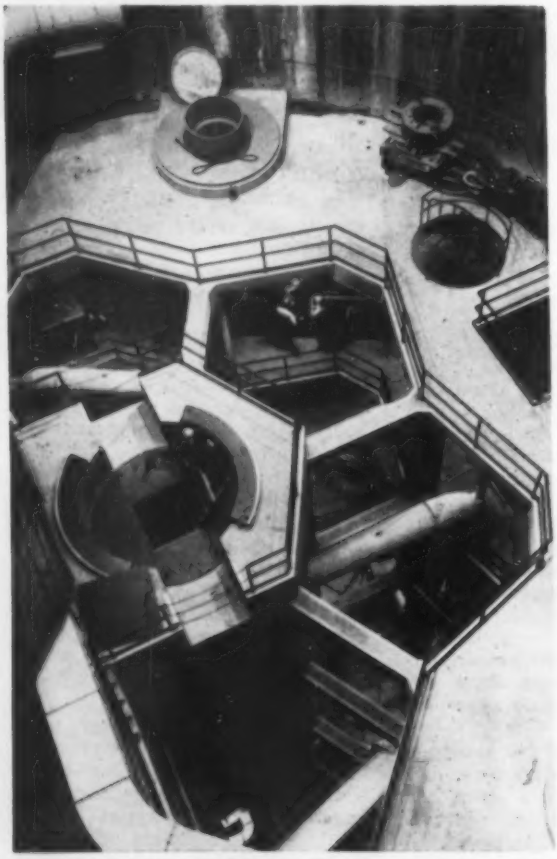
In conclusion a few figures from time studies of the actual sub-level caving, i.e. the above-mentioned team work, are given in table below. As is common in Swedish mines, the actual working time amounts to 65 percent of the total time of the shift, i.e. about 310 minutes per 8-hour shift. The balance consists of, inter alia, normal and personal waste time, instruction given by foreman, etc. The time is thus made up by:

Time Spent	*Percent*
Drilling in roof and pillars	13.0
Charging and blasting	3.5
Loading	24.0
Outward transport and dumping	15.0
Handling boulders	2.5
Other work	7.0
Total	65.0

The next problem requiring a solution at Grägesberg is that of transferring ore from the slice levels. Needed is a method to replace hand tramming by some form of mechanized transport. Although experiments in this connection are being carried out, it is too early at this stage to predict the final outcome.



LOOKING NORTHEAST across Reserve Mining Company's E. W. Davis Works. Early stages of construction of the pelletizing plant can be seen. In the center are the concentrator building, fine crusher building, storage bins and car dumper.



CRUSHING INSTALLATION at Babbitt, Minnesota weighs 1,200,000 pounds and was sunk 167 feet into solid rock. Shown is an interior view of the coarse crushing building.

First Taconite

Reserve Mining Company has successfully produced the first taconite pellets at its E. W. Davis Works at Silver Bay, Minnesota. These are the first pellets ever produced at a commercial-scale taconite plant in the United States.

Reserve is rushing completion of its huge Silver Bay plant, with full capacity at the rate of 3,375,000 annual tons of pellets to be reached in 1956. The first of 12 identical milling circuits at Silver Bay was placed in operation with only a few usual starting-up difficulties. Experience gained in operating this section will speed full production from the other sections as they are finished and placed in operation.

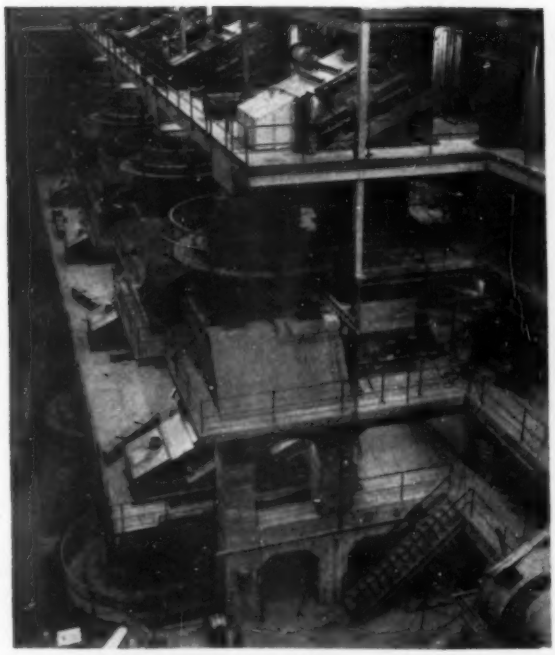
Commercial production at Silver Bay is the successful result of more than 40 years of work on taconite by Dr. Davis. Most of this time he was head of the University of Minnesota's Mines Experiment Station. The plant is also a monument to the officials of the Armco Steel Corporation and the Republic Steel Corporation, joint owners of Reserve. They have created a new segment of the domestic industry. They have raised and spent $200,000,000 to bring the E. W. Davis Works into production.

Taconite ore for the new plant is mined by open pitting near Babbitt, Minnesota, and trucked to the nearby primary crusher—the world's largest gyratory. Crusher discharge, minus-5-inches, is loaded into 87.5 ton railroad cars shipped 47 miles to Silver Bay for secondary and tertiary crushing, rod milling, magnetic cobbing, ball milling, hydroseparation, magnetic concentration, filtering, balling, and heat hardening.

Minnesota taconite is here to stay.

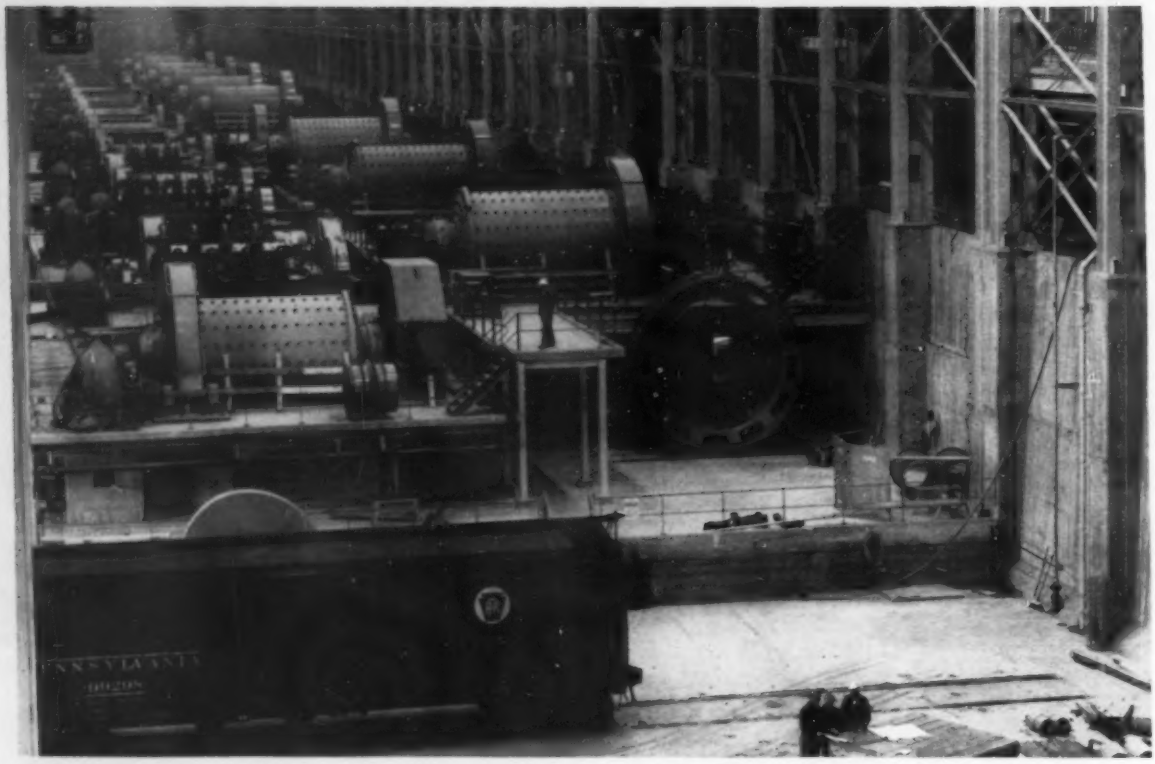
INTERIOR VIEW of the car dumper building at Reserve's E. W. Davis Works at Silver Bay, Minnesota. This car dumper will empty a car a minute without uncoupling. This is the only installation of its type using a standard gauge rail.

Milled At Reserve's Davis Works



MINUS-FOUR-INCH ROCK will be introduced to two crushing stages in this fine crusher building at Silver Bay. The first crushing reduces rock to 1¾ inches and the second to ¾-inch.

LARGEST GYRATORY CRUSHER in the world, this 60-inch coarse crusher at Babbitt will handle pieces of hard taconite rock up to 5 feet in diameter and crush 60 tons in a minute.



INTERIOR OF THE CONCENTRATOR BUILDING at Silver Bay, Minnesota. These rod mills on the right and ball mills on the left will grind ¾-inch crushed taconite to the fineness of cement or face powder.

1,700 FOOT CONCENTRATOR BUILDING also houses magnetic and hydro separators and dewatering filters. Following the magnetic and hydro separation, taconite ore containing 25-30 percent iron will contain 64 percent iron.

NEW 85-FOOT HEADFRAME was erected in 5½ days by Consolidated Western Steel Company over the Number 3 shaft of the idle Western borax mine. The structure is similar to those seen at Butte where all four legs taper toward the head sheave.

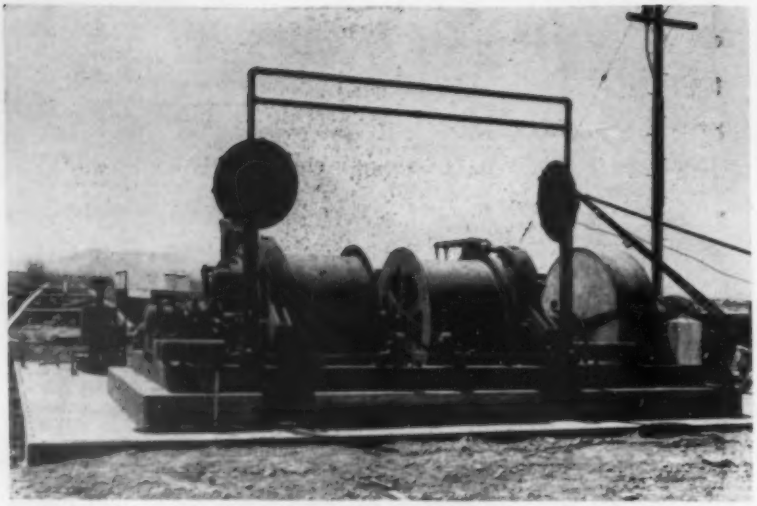
Development Of New Borax Mine Rushed In Southern California

Borate deposits in the famed Kramer district midway between Barstow and Mojave, California commonly occur at a depth of 300 to 1,000 feet below the surface in Tertiary sediments. Precisely at noon on August 31 a small work force from Consolidated Western Steel Company put the finishing touches on a brand new 85-foot structural steel headframe which had just been erected over the Number 3 shaft of the idle Western Borax mine. This mine, inactive for years, will be put back into production by a new company to be formed by the Mudd interests of Los Angeles, California. This will provide Boron, California, home of the Twenty Mule Team Borax, with a new producer, and will give added strength to Southern California's claim to 95 percent of world production.

The Mudd interests have acquired ground in the area, will recondition some of the old mine workings, and will tap reserves of tincal ($Na_2B_4O_7$ $10H_2O$) and kernite ($Na_2B_4O_7$ $4H_2O$). The 975-foot number 3 shaft will be sunk nearly 200 feet to develop a new haulage level at the 1130 horizon. Markets and outlets for production are yet to be developed; therefore, plans for production and operational methods necessarily remain in a preliminary stage.

These events have taken place so far:

1. Acquisition of the inactive Western borax mine from Borax Consolidated of England, whose American division, Pacific Coast Borax Company, is a major operator in the area;
2. Leasing an adjacent 10-acre block of ground known as the Little Placer lease from the Federal government. The Mudd interests submitted the high bid.
3. Reconditioning and unwatering of the Number 3 shaft, plus some preliminary extension of drifts and crosscuts on the existing 938 level (underground work is serviced from the shorter Number 1 shaft);
4. Erection of headframe and hoist installation to handle anticipated



DOUBLE DRUM 300 HP Nordberg hoist was acquired from the United Verde Extension at Jerome, Arizona. The unit will hoist a 3-ton payload at 800 feet per minute. The skip and cage will work against a counterweight in the second compartment.

production at the Number 3 shaft.

The Mudd holdings in the area total nearly 480 acres. Exploration work and surface drilling confirmed decision to reopen the semi-developed property. The bedded deposit dips at approximately 15° and is 30 to 200 feet thick. Most of the production will come from the 1130 level; the work now being done on the 938 level is primarily to provide ventilation and access to future stopes worked from the lower elevation. Initial plans are to use room and pillar mining methods, mining slots up the dip of the beds, and removing ore to the haulage level with slushers. Production may reach 300 tons per day in the future.

The Number 1 shaft, down 870 feet, is connected to the old mine workings on the 938 level by an incline. Prior to the completion of the new modern installation at the Number 3 shaft it provided the entrance for supplies and men to do the preliminary underground work. The headings now being extended on the 938 level are driven using airleg drills. The broken muck is scraped from the face with a 10-horsepower Gardner Denver slusher and deposited in old stopes. No attempt has yet been made to hoist this development rock.

New Headframe

The new headframe, containing two 50-ton receiving hoppers, was erected in just 5½ days. The structural steel members were cut to fit a predetermined design and shipped to Boron from Los Angeles. The structure is similar to those seen at Butte where all four legs taper toward the head sheave.

The collar of the shaft, which is at an elevation of 2,460 feet above sea level, is concreted. The shaft contains two compartments, each measuring 4 by 4½ feet inside dimensions. It is planned to use a Kimberly type skip and cage as a unit with a counterweight in the second compartment. The skip capacity is 3 tons.

SKIPS USED will be Kimberley type. Compartments in two compartment shaft will measure 4- by 4½-feet (inside dimensions).

The hoist is a double drum Nordberg unit which formerly saw service at the United Verde Extension at Jerome, Arizona. The drums are 5 feet in diameter; the 3-foot drum faces are grooved for 1¼-inch rope. The 300 horsepower drive motor will hoist the 3-ton payload up the shaft at 800 feet per minute. Power brought to the mine at 2,300 volts is transformed to 220 volts for the hoist control circuit.

It is expected that sinking just started will be finished sometime after the first of next year.

Uses of Borax

The borates mined at the Kramer district eventually find their way into a wide number of industrial outlets. Some of the more common purposes for which borax or boric acid is used depend upon its excellent cleansing action. Borax is widely used in the manufacture of soaps, disinfectants, and cosmetics. It is an essential constituent in the manufacture of porcelain enamels, ceramic glazes, and other coating products for many household appliances. The glass industry is a large consumer of borax, because it aids in the melting process and increases the strength, brilliance, and durability of glass. Even larger users are the sanitary ware and ceramic industries. The fluxing qualities of borax are well known. Recently, the production of boron-treated steels has grown rapidly. In the 1951 *Minerals Yearbook*, it was estimated that 15 to 20 percent of the alloy steel produced in the United States contained boron.

Marketing Problems

Since borate products find such a wide variety of industrial uses, it would seem logical that demand would closely follow economic cycles and the general level of industrial activity.

As pointed out by Mine Manager Ken Richmond, the borax producer, along with other nonmetallic producers, must develop a market for his product. This is in contrast to the metal miner who generally has well defined channels in which to sell his output. Once a market is developed the borax producer is faced with the problem of maintaining the market, meeting specifications and transportation problems to the many outlets.

Planning at the new operation is now in the embryonic stage. Many details of mining and future treatment cannot be predicted too accurately until production outlets are established.

The Engineer's Report

CASE HISTORY

PRODUCT *Chevron Starting Fluid*

FIRM *San Francisco Chemical Co, Montpelier, Idaho.*

Fast starts save 50 man-hours each day!

WITH TEMPERATURES DOWN TO 20 BELOW ZERO for weeks, Chevron Starting Fluid speeds up starts of trucks, tractors and shovels at San Francisco Chemical Co.'s phosphate mine at Leefe, Wyoming. Winter temperatures here sometimes drop to 50 below zero, but even then Chevron Starting Fluid makes it possible to start both diesels and gasoline engines. According to Mr. P. S. Pugmire, General Superintendent, this occasionally saves the mine up to 50 man-hours a day — about 2 hours starting time for drivers of trucks and tractors, also time of other workmen who cannot begin work until equipment is operating. Chevron Starting Fluid is available in 1-pint cans and in 7- and 17-cc gelatin capsules. Your supplier also has the new Chevron Pressure Primer System using safe 9.9-cc pressurized steel bulbs which, when punctured, force priming fuel into air intake system, permitting instant ignition.

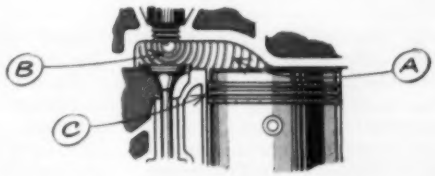
FREE FOLDERS tell you more about Chevron Starting Fluid and the Chevron Pressure Primer System Write or ask for them today.

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your distributor, write or call any of the companies listed below.

CHEVRON STARTING FLUID

TRADEMARK "CHEVRON" REG. U. S. PAT. OFF.

How CHEVRON Starting Fluid Starts Gasoline and Diesel Engines Instantly



A. Atomizes in lowest temperatures and provides easily ignited vapor in combustion chamber.

B. Pressure, or the weakest spark, fires mixture—turns engine and heats air for regular fuel mixture.

C. Contains lubricant and additives—inhibits cylinder wear and ice formation in primer equipment.

STANDARD OIL COMPANY OF CALIFORNIA
225 Bush Street • San Francisco 20, California

THE CALIFORNIA COMPANY
P. O. Box 780 • Denver 1, Colorado

STANDARD OIL COMPANY OF TEXAS
P. O. Box 862 • El Paso, Texas

Improved Du Pont CD Blasting Machines

FASTER OPERATION–LESS MAINTENANCE

Improved performance during an extra-long service life is what you get from the newer Du Pont CD Blasting Machines.

Designated CD-32-1 and CD-48-1, these newly designed machines maintain the condensers in a fully charged condition at all times . . . preventing condenser deterioration and reducing current drain from the batteries to a negligible quantity. This keeps the condensers at the same potential as the batteries. Result: greatly prolonged battery and condenser life, less need for service in the field.

The continuous-charge feature also eliminates the elapsed time between depressing the ready switch and the lighting of the neon lamp. As soon as the ready switch is pressed, the light glows, and the blast can be fired at once by pushing firing button. Result: faster operation.

These powerful, efficient machines retain the excellent characteristics of all CD Blasting Machines: lightweight . . . great safety . . . no moving parts . . . absence of costly permanent shooting lines . . . ability to fire large numbers of caps in series or parallel series.

If you would like complete information on the improved CD-32-1 and CD-48-1 Blasting Machines, see the Du Pont explosives representative in your area, or write to E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Del.

OWNERS OF CD-32 and -48 BLASTING MACHINES may have them converted to the improved CD-32-1 and -48-1 machines for a moderate charge. Ask the Du Pont representative in your area for details.

DU PONT EXPLOSIVES

Blasting Supplies and Accessories

DU PONT

REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

United States

Personalities in the News

W. LUNSFORD LONG (right), president of the Tungsten Institute, has been named president of three companies in the strategic metals mining industry. He now heads Manganese, Inc., Haile Mines, Inc., and Tungsten Mining Corporation, following the death of **HEWITT S. WEST** in September. (For a tribute to the late Mr. West see page 62, this issue.) Mr. Long had been vice president of the three companies since their organization. Manganese, Inc. has properties at Henderson, Nevada; Haile Mines operates mines in Arizona, New Mexico, North Carolina, and South Carolina; and Tungsten Mining Corporation's operations are located in North Carolina. Mr. Long will continue to maintain offices in New York City.

E. C. Herkenhoff, metallurgist with Pickands Mather & Co., Hibbing, Minnesota, has left that position and joined the Utah Construction Company staff. His new job will be that of chief metallurgist at the firm's new ore dressing laboratory in Palo Alto, California. A long-time iron ore beneficiation expert, Mr. Herkenhoff will be in charge of all research and beneficiation for the widespread properties of Utah Construction as well as the Palo Alto laboratory.

Paul C. Feddersen retired last month as general manager of the Bunker Hill & Sullivan Mining and Concentrating Company, Kellogg, Idaho. Mr. Feddersen started his career with Bunker Hill in 1917 as an assayer. He became general manager in 1954.

J. E. Foard, Phelps Dodge Corporation, has been appointed metallurgist at the firm's Douglas, Arizona smelter. He has been with the Douglas organization for seven years and was formerly associated with Inspiration Copper Company.

Abbott Charles, Norbute Corporation, has been named manager of western mining activities for the firm.

WALT BURLESON has been named chief mining engineer of a new organization, Sweet's Engineering Consultants, with offices in Denver, Colorado. He will direct the mining division of the new firm, which has been formed by a group of Rocky Mountain area engineers headed by **ANDREW T. SWEET** and specializing in consulting geological service, radioactive surveying, assays, mine and prospect evaluations and research. Mr. Burleson is a vice president of the Colorado Mining Association and former United States Bureau of Mines chief in Spokane and Seattle, Washington. He has been connected with Magma Copper Corporation, Garfield Mines, and Antero Mines.

—Lainson Studio

Vernon T. Dow was appointed manager of the Ringtail uranium mine operated by the firm on the Colorado Plateau.

Albert J. Fitch, The Anaconda Company, was promoted from general superintendent to assistant manager of New Mexico Operations. Mr. Fitch has been active in New Mexico mining for many years, and before joining Anaconda's uranium venture had worked in a supervisory capacity at the U.S. Smelting, Refining and Mining Company's operations near Silver City, New Mexico.

Jens Jensen, Pend Oreille Mines and Metals Company, has succeeded the late **Lewis P. Larsen** as president of the Metaline Falls, Washington, operation. Mr. Jensen had been vice president and treasurer.

William Gibson, Kennecott Copper Corporation, is division industrial engineer for the Nevada Mines division, McGill, Nevada. He replaces **M. J. O'Shaughnessy**, who was recently named assistant general manager of the division.

Frank Conrow has been named geologist on the exploration staff of western operations, United States Smelting, Refining and Mining Company, Salt Lake City, Utah. He has had extensive consulting experience in the Montana and tri-state mining districts.

Lucien Hugh Cullen, until recently president of Atomic Power Uranium Corporation, Utah and Colorado oil and uranium producer, was elected president of the newly formed Cullen Minerals Corporation. The new firm plans immediate entry into the uranium, oil and gas fields.

Fred L. Shanklin, Union Carbide and Carbon Corporation, New York City, will direct activities of the ore division for the company. Mr. Shanklin's appointment to the position of general manager of the division and vice president of the corporation was announced recently. He succeeds **C. W. Volz**, who retired after 42 years with the company.

Quinton T. Martin, Oliver Iron Mining Division, United States Steel Corporation, has been appointed to the newly created post of manager, industrial engineering. He will supervise industrial engineering functions dealing with the determination of wage and salary rates, incentives and methods to reduce costs and improve efficiency.

John A. Bowsher, formerly in the Spokane, Washington, office of the U. S. Bureau of Mines, is now representative of the Bureau in western Montana. His headquarters are in Butte.

William M. Sirola, formerly with Bear Creek Mining Company, is now employed by Kennecott Copper Corporation as senior geologist. He is now working on a project to make a complete geological map of the Nevada Mines Division operating area.

A district office of the United States Atomic Energy Commission has been opened in Spokane, Washington. Geologist in charge is **D. L. Hetland**, who was transferred from the AEC's Reno, Nevada headquarters. Assisting him are staff geologists **James L. Barlow**, **C. Van Alstine**, and **Richard Maise**.

WALLACE G. WOOLF, for the past 32 years manager of Sullivan Mining Company's electrolytic zinc plant at Kellogg, Idaho, heads the new metallurgy division of Bunker Hill & Sullivan Mining & Concentrating Company. In his new position he will have charge of the Bunker Hill lead smelter operations, the zinc plant operations, and sales and ore procurement. His appointment was part of a general reorganization program by the parent firm, which included the establishment of two new divisions. The other new department is that of plant services, to be headed by **HAROLD E. LEE**, formerly lead smelting superintendent. (For complete details on Bunker Hill's reorganization see page 83).

John Stitzer has begun his duties as staff engineer for Potash Company of America, Carlsbad, New Mexico. He is a mining engineer from Chisholm, Minnesota.

James I. Craig, who has been plant chief at the Austinville, Virginia, mine of the New Jersey Zinc Company since 1950, has been made superintendent of the firm's Hanover, New Mexico, operation.

T. H. Mueller has become assistant to the president of The New Jersey Zinc Company, New York City. He formerly was president of Julius Kayser & Company.

C. LeRoy Hoyt, former chief engineer for Ray Mines division, Kennecott Copper Corporation, Ray, Arizona, has been named administrative assistant to the general manager. **Harold W. Bishop**, formerly chief engineer for Consolidated Coppermines Corporation, Kimberly, Nevada, has succeeded Mr. Hoyt as chief engineer.

RUSSEL B. CAPLES, president of Anaconda Aluminum Company, has been elected vice president in charge of metallurgical operations for The Anaconda Company by the parent firm's board of directors. A past president of the American Zinc Institute, Mr. Caples has been an Anaconda employee since 1910, and from 1941 to 1953 he was general manager of the company's electrolytic zinc plant and copper refinery at Great Falls, Montana. Mr. Caples succeeds **FREDERICK LAIST** in his new position. Mr. Laist retired in September after 51 years with the Anaconda organization. Named assistant to Mr. Caples is **WILLIAM WRAITH, JR.**, formerly assistant general manager of Chile Exploration Company, Anaconda Chilean affiliate.

Thomas Bardon, president of the Shattuck Denn Mining Corporation, New York City, recently completed a trip to the firm's lead, zinc and uranium operations in the western United States.

Frederick F. Frick, for the past 40 years research engineer at the Anaconda Reduction Works of the Anaconda Company, has retired. His successor is **Francis L. Holderreed**, who has been assistant engineer to Mr. Frick since 1953. Mr. Holderreed's assistant will be **Robert E. Sullivan**, Butte, Montana.

Gordon Weller, former public relations director for western operations, has been named advertising manager of Climax Molybdenum Company. Mr. Weller, who joined Climax in 1953, is now in the New York City office of the firm. He has been succeeded at Climax by **Donald Stephens**, a member of the public relations department.

Charles H. Weaver, Westinghouse Electric Corporation, has been elected a vice president with responsibility for all Westinghouse atomic power activities. He has directed the company's atomic power division since it was organized in 1948.

Robert Dwyer, president of The Anaconda Company, was a recent visitor in the Rocky Mountain area. He inspected the firm's open pit copper mine at Yerington, Nevada. He also conferred with **F. A. Wardlaw, Jr.**, general manager of the affiliated International Smelting & Refining Company in Salt Lake City, Utah.

OBITUARIES

K. P. Chikara, well known mining geologist and engineer, died from injuries received in a motor accident in Portuguese East Africa in August. Dr. Chikara was in charge of operations in the two A. V. Lillas concessions in Portuguese East Africa. His consulting business took him to all parts of Africa and Europe, and his lifelong ambition had been to aid in the economic development of central Africa by promoting its mining industry and mineral possibilities.

Two officials of Compania Minera de Guatemala, S.A. were killed in a plane crash in Central America during September. **Carl Louis Alt**, 41, was assistant manager of the firm. He had been at the Caquipec mine for five years and had worked previously for the Braden Copper Company in Chile. His home in the United States was in Denver, Colorado. **Lowell S. Cook**, 41, was mine superintendent and had direct charge of operations at Caquipec and Purulha. A native of Vernal, Utah, Mr. Cook had worked for U. S. Smelting, Refining & Mining Company and for Combined Metals Reduction Company.

Dale Leatham Pitt, 71, managing director of Selbak Premier Mines, Ltd., Vancouver, British Columbia, died in September. He was a member of the American, Canadian, and Australian Institutes of Mining and Metallurgy and was also affiliated with the American Mining Congress.

George Skakel, Sr., 63, chairman of the board of directors of Great Lakes Carbon Corporation, and his wife, Ann, were killed October 3 when a company plane crashed near Union City, Oklahoma. Mr. Skakel had been named president of the firm at the time of its organization in 1923. He became board chairman in 1953.

Hewitt S. West

Hewitt S. West, 65, president of Haile Mines, Inc., since 1936, died at Memorial Hospital in New York City, September 2. He had been active in mining for the past 30 years, and under his leadership Tungsten Mining Corporation and Manganese, Inc., controlled by Haile Mines, had become two of the largest producers of the metals in the United States.

A spirited man, with foresight and zeal, he had exerted his efforts toward the development and future of mining. Recognized for his determination and achievements, his passing is a loss to the metals mining industry.

Mr. West and his wife made their home in Nevada, near Henderson, which is the site of operations of Manganese, Inc. for many years. He was a member of the American Institute of Mining and Metallurgical Engineers and took a prominent part in the American Mining Congress. Shortly before his death he had been named co-chairman of the AMC convention which was held in Las Vegas, Nevada in October.

Surviving are his widow, Elizabeth M. West and two sons, Hewitt S. West, Jr., Bronxville, New York, and John M. West, Boulder City, Nevada.

F. A. McGonigle
Vice President &
General Manager
Manganese, Inc.

geophysical measurement and mapping

Hycon offers a complete service... magnetic, photogrammetric, radiation, electromagnetic.

• Varian airborne magnetometer • Varian high accuracy station magnetometer • Varian portable magnetometer • Hycon airborne scintillation counter • Airborne electromagnetic survey equipment • Aerial photography • Topographic mapping

MAIN OFFICE:
1020 S. Arroyo Parkway
Pasadena, California
SYcamore 9-4570,
PYramid 1-1028

WASHINGTON OFFICE:
910 17th St. N.W.,
Washington 7, D.C.
STerling 3-7070

DAYTON OFFICE:
Room 512
11 West Monument Ave.
Dayton 2, Ohio
HEmlock 2897

ILLUSTRATED BOOK

MAIL

Hycon
AERIAL SURVEYS, INC.
"Where accuracy counts"

HYCON AERIAL SURVEYS, INC.
1020 SOUTH ARROYO PARKWAY
PASADENA, CALIFORNIA

Please send brochure showing examples of your work.

Name_____

Address_____

City_____ State_____

Newsmakers in International Mining

At special ceremonies held in New York by the Republic of Chile honoring "illustrious foreigners" who have been of service to that nation, **THOMAS A. CAMPBELL** (right), executive vice president of Chile Exploration Company, was awarded the Order of Merit in the rank of Knight Commander, Order of Bernardo O'Higgins. Conferring the honor was **ENRIQUE BUSTOS** (left), Consul General of Chile in the United States. Also present was **JOSE MAZA** of Chile, President of the United Nations General Assembly. In accepting the award Mr. Campbell said that The Anaconda Company, of while Chile Exploration is a subsidiary, would do its part to fulfill expansion and development of copper output in Chile and to obtain an assured place for it in the world's market. He pointed to the reopening of the Africana Mine of the Santiago Mining Company (see page 68 for details of this development), the plan to invest more than $38,000,000 additional capital at Chuquicamata, and Anaconda's new mine prospect at Indio Muerto. Another Anaconda official, board chairman **ROY H. GLOVER** was recently honored by the Chilean government with the Order of Merit. (See MINING WORLD, June 1955, page 67.)

George A. de Neve, formerly with the Indonesian Bureau of Mines and Geological Survey, has been appointed chief geologist and head of the exploration department of the Banka Tin Mines. He will be stationed at Pangkalpinang, Bangka. The company also announced the appointment of **Felix Hermann**, consulting engineer from Paris, France. As well as serving in a consulting capacity to Bangka Tin Mines, Dr. Hermann will be a consultant in the fields of mining and mineral economics for the Ministry of Economic Affairs.

Changes at Mount Isa Mines, Ltd., Mt. Isa, Australia, include the following: **J. W. Foote**, formerly with Zinc Corporation, Ltd. at Broken Hill, is now general manager; **J. Redpath**, chief engineer, was named services manager; **G. J. Burton** has been promoted from assistant mine superintendent to production manager.

Harry Kirmond has been named vice president and general manager of Consolidated Fenimore Iron Mines Limited, Montreal, Canada. For the past two years he has had a consulting practice in San Francisco, California.

Several appointments have been announced for the Salisbury, Southern Rhodesia office of Anglo American Corporation of South Africa, Ltd. **K. C. Acutt** has been appointed resident director; **C. P. Nicholls**, manager; **H. M. Forrest**, consulting engineer; and **G. Bradford**, consulting mechanical and electrical engineer.

An unofficial delegation from the Japanese mining industry was recently in Indonesia surveying iron, copper, ilmenite, nickel, and lead ore deposits. The representatives were **I. Sonohara**, director of the Nippon Mining Company, Ltd.; **G. Takata**, adviser to Ishihara Sangyo Kaisha Ltd.; **Motowo Takahashi**, Teikoku Oil Company.

S. G. Salamy is now at Broken Hill Pty. Company Ltd. in Newcastle, New South Wales, Australia. He formerly was with King Island Scheelite N.L., King Island.

Howard Steven Strouth, chief of the mining division, Standard Ore and Alloys Corporation, is now in Johannesburg, Union of South Africa assisting in the mechanization speedup of Standard's Palmiet Chrome mine. The mine has already doubled its production and eventual output is expected to reach 4,000 tons of high-grade chromite concentrates per month.

Kunimitsu Takegami and **Kudusuke Kii**, mining engineers from C. Soubra and Company, Tokyo, Japan, have been working with the technical staff of Paracale Iron Mines in the Philippines for the past two months. They are in the Philippine Islands at the invitation of Juan Ysmael and Company.

Caland Ore Company, Atikokan, Ontario, Canada has made the following personnel changes: **Nathaniel Scott**, from senior engineer to project engineer; **John B. McLellan**, from senior engineer to assistant chief engineer; **Frank C. Loring**, from senior engineer to mechanical-electrical engineer.

Bernard L. Anderson was named vice president of A. Soriano y Cia., Philippine engineering concern.

Alberto J. Terrones, assistant chief geologist, exploration, Cerro de Pasco Corporation, has left Lima, Peru and returned to his home in Mexico. Mr. Terrones was the second geologist to graduate from a university in Mexico and the first in his country to receive a Master's Degree.

Jack B. Ward, manager of Tsumeb Corporation, Ltd., Southwest Africa, has resigned his position and returned to the United States. He was manager at the large copper-lead-zinc operation since 1947. His headquarters are now in Santa Rosa, California.

Jesse Johnson, director of the Division of Raw Materials, United States Atomic Energy Commission, was in the Union of South Africa recently, following his attendance at the United Nations "Atoms for Peace" conference in Geneva, Switzerland.

Ralph H. Workinger, who has served as regional United States Operations Mission director in Iran for three years, has been named deputy director of the Internation Cooperation Administration Mission to Ethiopia.

ALLAN E. JONES, who has been associated with the United States Atomic Energy Commission's Raw Materials Procurement program in the Union of South Africa for the past three years, has been named Deputy Manager of the AEC's Grand Junction Operations Office, Grand Junction, Colorado. Mr. Jones has a background of nearly 23 years in various phases of the mining industry, including 18 years with Surcease Mining Company, California gold and tungsten operators. Mr. Jones' new duties will be concerned with AEC activities related to the finding, mining, and processing of uranium ores and concentrates in the western United States.

Allen Bakewell, formerly with Kennecott Copper Company, is now assistant general superintendent of Baguio Gold Mining Company, Philippine Islands.

W. Alexander and **J. K. Nessling**, Ruston-Bacyrus Ltd., England, have been visiting open-pit operations in the United States.

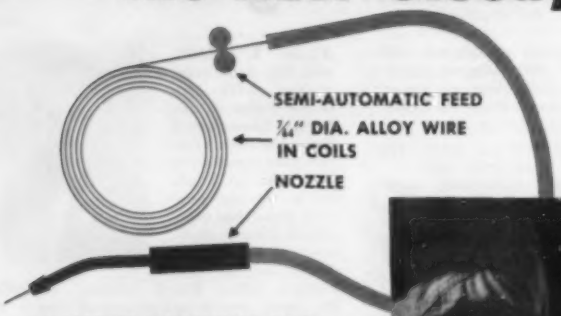
E. W. Gibson has succeeded **Ben Martin** as general superintendent of the Paracale-Gumaus Mining Company in Camarines Norte, Philippine Islands. Mr. Martin previously was with Benguet Consolidated Mining Company.

A. D. Busby, a member of the Mond Nickel Company staff for 18 years, has resigned his position in the development and research department. He has taken up the post of deputy process development manager of titanium department, I.C.I. (Metals) Ltd., Witton, Birmingham, England.

F. Elliott has been appointed representative and technical consultant for Messina (Transvaal) Development Company, Ltd., Salisbury, Southern Rhodesia. He is also a director of Rhodesia Copper Ventures, Ltd.

ROBERT B. ANDERSON, who recently resigned as United States Deputy Secretary of Defense, has been named president of Ventures Limited, Canadian holding company which has mining interests in nearly every part of the free world. He succeeds **THAYER LINDSLEY**, founder of the company, who is scheduled to become chairman of the board. Through its subsidiaries and affiliates, Ventures controls or has an interest in some 15 operating companies, 20 development companies, and 145 participations in the mining, research, and metallurgical fields. Prior to his service with the Federal Government, Mr. Anderson was general manager of the W. T. Waggoner Estate in Texas, which included extensive oil holdings.

SEMI-AUTOMATIC HARD-FACING with the NEW Stoody Alloy Tubular Wires



- bare wire... no flux
- complete visibility
- three times manual speed
- enormous savings in labor

IN EARTH-WORKING AND CRUSHING OPERATIONS

This is a totally new hard-facing method utilizing the welding speed of the semi-automatic machine to produce sound deposits of wear-resistant alloys. The wires run bare, using no flux, so that the weldor enjoys full visibility at all times... deposition rates at normal welding currents (200 to 300 amps) are double or triple those of the manual method... standard semi-automatic equipment is easily converted to handle Stoody wires.

Maintenance time and welding costs are reduced through increased service life provided by Stoody alloys and the greatly increased welding speed. Weldors like the semi-automatic, find it easy to operate with less fatigue.

Your Stoody dealer (check the "yellow pages" of your phone book) will be glad to give you full information, plus a demonstration on your own equipment without obligation. Or write to the company for literature and the name of your nearest dealer.

STOODY COMPANY
11969 East Slauson Avenue
Whittier, California

SHOVEL BUCKETS: TEETH, LIPS, ADAPTERS, ETC., *Stoody 121 gives good wear resistance, quickly covers wearing areas on this clamshell and other types of buckets.*

ALL TYPES OF CRUSHERS: *An ideal application for Stoody 100 because of excellent wear resistance and impact strength. Rolls can be hard-faced much faster with semi-automatic welder.*

Stoody 100... a high chromium alloy wire for equipment subject to severe abrasion and impact. This is similar to Coated Tube Stoodite. Used on crushers, buckets, rippers, augers, tool joints. Deposits 10 to 18 pounds per hour.

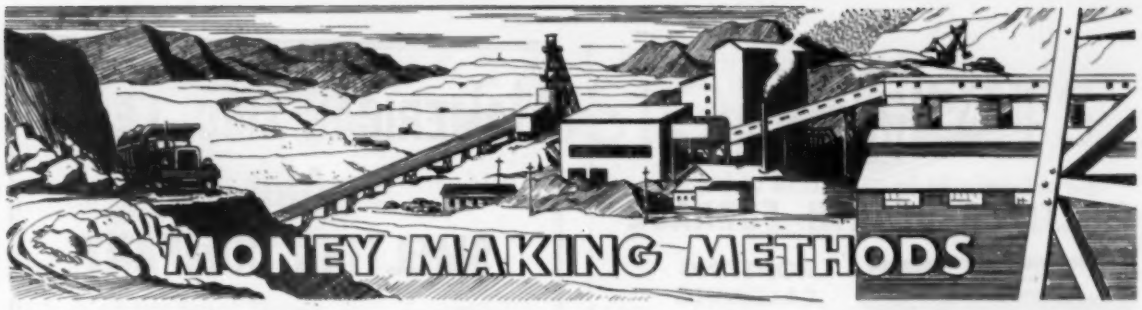
Stoody 121... a medium alloy material with excellent resistance to abrasion and impact. This is similar to Stoody 21. For bucket teeth, shovels, grizzlies, loader lips, crushers. Deposits 9 to 16 pounds per hour.

Stoody Nickel Manganese... produces a Hadfield manganese deposit for build-up of all manganese parts—crushers, buckets, shovels, teeth—preparatory to hard-facing. Deposits 4 to 7 pounds per hour.

BULLDOZER END BITS: *Can be hard-faced in one third of time required by manual process. Stoody 121 is recommended.*

SCRAPER BLADES: *Parallel beads of Stoody 121 are fast and easy to apply to scraper blades, add excellent wear resistance.*

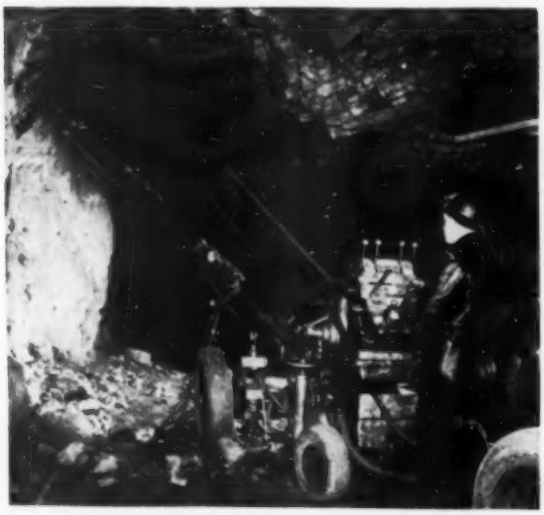
SHOVEL TRACK PADS: *Use of Stoody Manganese applied by semi-automatic welder cuts time on maintenance.*



Kiruna Mine To Use Decentralized, Hot Compressed Air Supply System

The high-grade iron ore in Sweden's Kiruna mine has been mined chiefly by open pit. The economic limit of surface working has now been reached, and a gradual change to underground caving, expected to be completed in the early 1960's, is already in progress. The development program provides for a production of 12,000,000 tons of ore per year, which will make it the largest underground mining project in Europe. The caving method to be used will be sub-level caving developed for extensive mechanization without the use of tracks.

The supply of compressed air to the numerous workings has raised several difficult technical problems. The ore body



ATLAS DIESEL JUMBO to be used underground at Kiruna.

extends over a length of more than 2½ miles, necessitating the provision of an extremely extensive and complicated air distribution system. Due to its location North of the Arctic circle, Kiruna has very low winter temperatures. Freezing in the pipe line systems and low temperatures in the underground workings, therefore are problems of considerable magnitude.

To overcome these problems, it is intended to provide a decentralized air supply system. Under this plan, heavy rock drills will be combined with separate portable compressors supplying them with hot compressed air without aftercooling. Hot compressed air is supplied from an electrically driven Atlas Diesel compressor fitted with rubber-tired wheels and delivering about 335 cubic feet per minute. Atlas rock drills are mounted on two chain feeds of the drilling unit (see picture).

At the present time, aftercoolers are used in most large compressor stations, enabling part of the energy consumed during compression to be recovered in the form of heat from the cooling water. On the other hand, in hot air operation this heat recovery is sacrificed to some extent in order to improve conditions in the workings and to ensure more reliable operation of the machines. Warm cooling water from the intercooler is also brought into the hot air supply scheme, being supplied to the rock drills for flushing purposes.

Several advantages are realized by the use of hot air and individual air supply units. The hot air supply has a lower specific gravity than cold air at the same pressure. The air consumption expressed in cubic feet is therefore approximately 30 percent lower, so that a compressor of lower capacity can be used. Moreover, an improvement of nearly 10 percent in the net drilling rate has been recorded in this experimental hot air operation.

The constant working pressure obtained when a separate compressor is used is of great importance in attaining the maximum net drilling rate. Pressure drops which frequently occur in large mains are thereby eliminated.

Leakage is another vital factor in considering compressed air consumption. In large air piping systems, even when carefully maintained, leakage is a large factor in air consumption. When the air source is located by the rock drills, this leakage is largely eliminated.

With the use of this hot air system, moisture in the air lines is largely eliminated. This prevents condensation in the drilling machines, thereby eliminating freezing and mist formation.

Some of the advantages of hot air drilling are, of course, largely conditioned by the cold climate and other local factors at Kiruna. It is true to say, however, that a decentralized compressed air system, together with hot air drilling, can also offer technical advantages in other mines with different conditions.

How Lake George Mine Ventilates High Raises and Pumps Acid Water

These recent improvements in mining technology at the Lake George lead-zinc-copper mine of the Lake George Mines Pty. Ltd. at Captains Flat, New South Wales, Australia should be applicable in many mines in other parts of the world.

Before driving development raises between levels, a diamond drill hole is drilled to connect the levels. The raise is then driven following the hole to keep it on course. The top of each hole is then connected to the compressed air line. Air is blown into the hole immediately after blasting a raise round. This blows the smoke and gas away from the top of the raise before the next shift starts work.

Much of the mine water is extremely acid with some water on the upper levels having a pH of 2.8. Pump discharge columns are now made of Fibrolite (cement-fiber) pipes. To prevent corrosion in steel pipes, a soluble oil, Caltex "A," is added to the water in the pump sump. The oil coats the pipe walls and has lessened corrosion considerably.

PACIFIC FURNACE

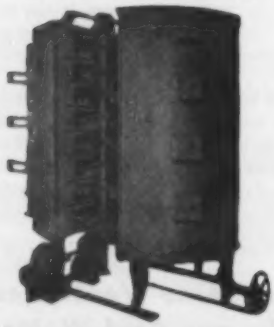
MULTIPLE HEARTH FURNACE

SIZES 8' 6" TO 22' 3" DIAMETER
NUMBER OF HEARTHS, 1-16

ROASTING
CALCINING
DRYING

ZINC ORES	QUICKSILVER
IRON ORES	MAGNESITE
COPPER ORES	LIMESTONE
TIN ORES	MOLYBDENUM
NICKEL ORES	BONE CHAR
LEAD ORES	DIATOMITE
SODA ASHES	LIME SLUDGE
FULLERS EARTH	MAGNESIUM
CARBON	CLAY GRANULES
PYRITE	ANTIMONY

SELENIUM
SEWAGE SLUDGE
LEAD CHEMICALS
METALLIC SLUDGES
FILTERING MEDIA
And for Numerous Other Materials



Pacific Laboratory Furnace

PACIFIC LABORATORY FURNACE

Manufactured in two sizes—36" and 54" inside diameters having 6-8-10 Hearths and include the same features as the commercial size furnace.

Pacific Furnacing Unit

NEW
PACIFIC FURNACING UNIT

Higher shell height. Three gas burners. Provision for conversion to muffle unit. Small volume roasts at any desired temperature.

PACIFIC FOUNDRY COMPANY LTD.
Engineers and Metallurgists

1400 So. Alameda St. Los Angeles
3100 19th St. San Francisco
551 Fifth Ave. New York

AMERICAN ZINC, LEAD AND SMELTING COMPANY

Buyers of Zinc Concentrates Suitable for Smelting in Retort and Electrolytic Smelting Plants, also Buyers of High Grade Lead Concentrates.

Address Communications to Ore Buying Department

Paul Brown Building
ST. LOUIS, MISSOURI

423 Mills Bldg.
EL PASO, TEXAS

927 Old National Bank Building
SPOKANE, WASHINGTON

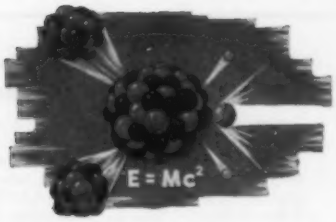
P.O. BOX 577
DUMAS, TEXAS

MAGMA COPPER COMPANY

Buyers of

COPPER, GOLD AND SILVER ORES

MINES AND SMELTER AT SUPERIOR, ARIZONA



FISSION FACTS

Monthly Roundup of Mining News In the Atomic Energy Field

U.S. Map for Sale; Shows Known Uranium Deposits

A map showing known uranium deposits of the United States is now available to the public for 50 cents. Prepared by the Geological Survey on behalf of the U. S. Atomic Energy Commission, the map measures 34 by 52 inches and has a scale of 80 miles to the inch. It shows where the principle types of uranium deposits are located—in sandstone or limestone, in phosphorite, in shale, in coal or lignite, or in veins. Deposits being mined now and those considered too low in grade to be mined under existing conditions are also indicated.

The map may be obtained by sending 50 cents to the Geological Survey Distribution Center, Washington 25, D. C., or the Federal Center, Denver 2, Colorado.

Malaya Will Assess Its Uranium Deposits

The Geological Survey Department of the Malayan Federation will undertake an appraisal of the country's uranium deposits. The staff will conduct a ground survey of a substantial area of hilly jungle lying between the Kuala Kubu Bahru Hills and Fraser's Hill. Last March torbernite was discovered 10 miles from Fraser's Hill.

The survey will mark out the potential prospecting areas for the first time. Until now there has been little private interest in uranium prospecting. Only one application for permission to go into the jungle for this purpose has been made the government. This application is still under consideration by the federal and state authorities.

The British Government, sole buyer of uranium in the Colonies and Dependent Territories, offers a profitable price for the radioactive mineral through the Ministry of Supply. Since 1950 the guaranteed price has been fixed at from £1 15s to £1 5s a pound of uranium oxide depending on grade of ore.

The guarantee applies to a minimum of 10 tons of concentrates containing not less than 10 percent uranium oxide or 500 tons of concentrates containing not less than 0.20 percent of uranium oxide. In addition, producers of up to one ton of uranium oxide may qualify for a development bonus equal to the price paid for it. This applies to the first five tons of uranium oxide produced.

Engineers To Hold Atomic Show, Congress Next Month

Three hundred technical papers treating the various aspects of atomic energy will be presented at sessions of the Nuclear Engineering and Science Congress and the Atomic Exposition to be held in Cleveland, Ohio, December 12 through 16. The Congress is sponsored by the Engineers Joint Council, and is expected to draw 2,000 delegates and visitors. Included in the tentative program are sessions on uranium deposits, uranium geology, nuclear properties, materials and metallurgy, and proposed reactor types.

AEC Calls for Proposals In Power Reactor Program

The "second round" of proposals for small-scale experimental nuclear power plants is now being accepted by the United States Atomic Energy Commission. An initial invitation was issued by the AEC in January under the Power Demonstration Reactor Program.

The current invitation, for which proposals must be received by February 1, 1956, is directed especially to nuclear power plants with the following capacities: 5,000 to 10,000, 10,000 to 20,000, and 20,000 to 40,000 kilowatts of electricity.

The AEC request for proposals in January has resulted in negotiations with two companies, the Detroit Edison Company and Associates, which is working on a fast breeder reactor plant of 100,000 kilowatts to be completed in 1959, and the Nuclear Power Group, which has proposed a boiling water reactor plant of 180,000 kilowatts to be completed in 1960.

Under the five-year reactor development program, five basic reactor concepts have been chosen for development. These reactor types are as follows:

Pressurized Water Reactor: This is the only large scale reactor in the original program. The plant now under construction is expected to provide reliable cost data for construction, operation, and maintenance of large central station nuclear power plants. A 60,000-kilowatt plant now under construction at Shippingport, Pennsylvania is under the joint auspices of the Duquesne Light Company of Pittsburgh and the AEC, with the government bearing 85 percent of the total cost.

Boiling Water Reactor: A third reactor of this type is being constructed by the AEC at Argonne National Laboratory and will produce 5,000 kilowatts. Two preceding experiments are located at the National Reactor Testing Station in Idaho.

Sodium Graphite Reactor: Based on graphite moderation and a sodium coolant, this project is located at Santa Susana, California. North American Aviation, Inc. has a cost-sharing contract with the AEC for its design, fabrication, and operation.

Fast Breeder Reactor: One fast breeder reactor, which produces more fissionable material than it consumes, is at the National Reactor Testing Station in Idaho. Another such plant will be constructed next year and should be in operation by 1958.

Homogeneous Reactor: In this type fuel, moderator, and coolant are in a homogeneous solution or slurry, which has potential advantages of simplified design, economical chemical processing and elimination of fuel element fabrication. One AEC plant is in operation and another under construction.

Centennial Development Bottoms Far West Shaft

The Far West shaft of Almar Minerals, Inc., which was sunk under contract by the Centennial Development Company of Eureka, Utah, has been bottomed at 573 feet. The 12- by 7-foot, two-compartment shaft encountered ore at about the 530-foot level. The property is located in the Big Indian mining district, San Juan County, Utah, approximately 1,500 feet northwest of the Radon shaft sunk by Hecla Mining Company, contract operators for the Federal Uranium Company. Pictured at left are the Far West shaft and headframe, which is 45 feet high and was designed and erected by Centennial. The sinking hoist, which was converted from an old steam powered machine, is in the shed located to the left of the headframe. The Far West shaft will serve as an access to ore bodies in the Chinle D horizon. By the first of October a shaft station had been cut, a slusher pocket completed, and a measuring chute installed. The property is under option to the Hidden Splendor Mining Company, Grand Junction, Colorado by assignment from Mountain Mesa Uranium Corporation, Casper, Wyoming. Mountain Mesa purchased the property from the Ruddock family of Denver, Colorado and Moab, Utah in April. (For details on this sale see MINING WORLD, June 1955, page 88.)

Kennecott Buys Interest In Columbium Property

Kennecott Copper Corporation has purchased a 52 percent interest in Tin & Associated Minerals Ltd. of Nigeria, owner of a columbium mine and concentrating plant. Purchase price was not revealed.

At the end of 1954, the company held mining leases over 5,204.93 acres, exclusive prospecting licenses over 35.76 square miles, exclusive prospecting licenses under application covering 78.68 square miles, and 24 water licenses over 199,693 feet, located in the Bauchi Plateau on Benue Provinces of northern Nigeria. Annual production has been about 600,000 pounds of columbite.

Surigao Will Develop Ancheta Copper Claims

Surigao Consolidated Mining Company has signed a contract to explore and develop on a royalty basis a group of copper claims belonging to the Ancheta Mining Company in Santa Cruz, Zambales province, Republic of the Philippines. The firm is known generally for its enormous chrome ore deposits.

Exploration work will consist first of sinking winzes; later diamond drilling will be used to determine the extent of mineralization of the property.

Surigao Consolidated, which owns and operates a gold mine in Surigao, Mindanao Island, recently took over exploration of the Raon-Lobo copper-barite ore deposits in Batangas, Luzon Island, under a contract with Pan Philippines Corporation. Six holes have already been drilled on this property, and preparations were being made to drill a seventh as this was being written.

Harvey Last Aluminum Firm To Get Federal Tax Aid

Harvey Machine Company of Torrance, California has announced that construction of its $65,000,000 aluminum reduction plant at The Dallas, Oregon, will begin early next year. The plant will make Harvey the nation's fifth producer of primary aluminum and will have an annual capacity of 108,000,000 pounds. Under a contract signed with the General Services Administration, a certificate of necessity permitting a fast tax write-off on part of the cost and assistance with loan guarantees and advance payments for production have been awarded the company. The plant will be financed with private capital, and the federal government will have first call on its output.

Since the contract is the outcome of a letter of intent which GSA gave Harvey in 1953, the company is not affected by the recent cut-off of federal assistance which was announced by the Office of Defense Mobilization. Tax benefits for the aluminum industry were suspended in August while the Defense Mobilization Board reviewed the question of further expansion assistance. Following the board's recommendation, Defense Mobilizer Arthur S. Flemming removed aluminum from the list of industries eligible for federal benefits. This action denies fast tax write-offs for projected plants of Revere Copper & Brass, Inc., Kaiser Aluminum & Chemical Corporation, Reynolds Metals Company, and St. Joseph Lead Company. All but the latter firm have signified their intention of continuing with expansion plans, despite the government decision. Revere is planning a $52,776,800 aluminum plant of 60,000 tons annual capacity at Wenatchee, Washington. Kaiser wants to build a 90,000-ton plant, but has not indicated where the facilities are to be located. Biggest of the new Reynolds facilities will be a 100,000-ton coal-powered plant in Kentucky, and two other projects, adding 35,000 tons of primary aluminum to existing Alabama and Texas plants, will be in operation next year.

New Canadian Subsidiary To Develop Irish Mine

Mogul Mining Corporation, Toronto, Canada, has taken over a copper-lead-zinc-sulphur property about 40 miles south of Dublin, Eire. A new Canadian company, Irish Copper Mines Ltd., has been formed to check the property's reserves and develop it to the production stage. A wholly-owned Irish company will then be formed by Irish Copper to run the property, which is located at Avoca, County Wicklow.

Development work started at the mine October 1. The program consists of fill-in drilling, exploratory drilling, and sinking of a 5-compartment incline shaft to a depth of 1,000 feet.

To date ore indicated by drilling is 15,000,000 tons. A 1,300-foot shaft sunk by the government has disclosed four ore bodies, one of which contains an estimated 9,000,000 tons averaging 1.07 percent copper. A second ore body contains 2,700,000 tons averaging 1.35 percent copper; a third contains 2,500,000 tons of 1.3 percent copper; and a fourth is believed to contain 500,000 tons of lead and zinc ore.

The Irish government has promised to exempt the company from income tax and corporation profits tax for four years from the start of production; for each of the next four years, 50 percent of profits will be exempted.

Mines Bureau Gets Funds For 1956 Mineral Program

The United States Bureau of Mines has been granted $18,863,000 for the fiscal year 1956. This includes $5,989,130 for studies on metallic and nonmetallic minerals, including research and investigations for more effective exploitation of mineral resources and commercial development of marginal and submarginal domestic mineral deposits.

Included in the Bureau's metals research program are: utilization of low-grade domestic materials as substitutes for imported bauxite in aluminum production; study of alloys of magnesium; improved methods for producing ductile titanium and zirconium; improved copper mining methods; recovery of metals from scrap.

The nonmetallic field includes research in the following: ways to reduce domestic dependence upon imports of asbestos, mica, and industrial diamonds; utilization of low-grade domestic deposits and development of synthetics; continued development of the "planer" machine to reduce cost of mining western phosphate rock; further studies in recovering fluorine from waste gas at phosphate processing plants.

Anaconda Starts Building Africana Reduction Plant

Construction of a reduction plant at the Africana mine of Santiago Copper Mining Company, subsidiary of The Anaconda Company in Chile, is now well underway. An investment of $2,000,000 is being poured into the operation, which was recently reopened by Anaconda. (For details on reopening of the Africana mine, see MINING WORLD, August 1955, Page 71.) Production, which will start next year, will total 20,000 metric tons of 25 percent copper concentrate per year.

USGS to Have High Level Mapping Program for 1956

Major effort of the United States Geological Survey's geologic division in the fiscal year of 1956 will be directed toward new geologic mapping and investigations of both potential and producing mineral and mineral-fuels areas. The Survey has just been granted $26,350,000 for conducting its various activities during this period. Funds have also been provided for the Survey's new headquarters building in Washington, D.C. which will consolidate activities that are now spread over 16 different locations.

Cooperative programs with the governments of Connecticut, Nevada, Alaska, and Puerto Rico to complete geologic mapping are underway. The Survey has established field parties in Pakistan, Thailand, and Indonesia to map mineralized areas under the auspices of the International Cooperation Administration. Similar projects are continuing in the Far East, Near East, Africa, and Latin America.

Philippine Team Finds Nickel in Iron Deposits

Test pitting and drilling during the past 18 months by the Philippine Bureau of Mines has revealed the existence of 29,000,000 metric tons of ferruginous laterite and serpentine containing 1.38 percent nickel. The deposits were located in the Surigao iron ore reservation on the island of Nonoc. President Magsaysay's cabinet has decided to offer the deposits for exploration and development to private mining companies through public bidding.

It is reported that two Canadian firms (Ventures Ltd. and International Nickel Company of Canada), three United States firms (Hanna Coal and Iron Company, Newmont Mining Company, and American Smelting and Refining Company), and a Japanese firm (Pacific Mining Company Ltd.) have expressed interest in the deposits. Representatives of Ventures and International Nickel have recently made inspection trips to the deposits.

The field work which outlined the deposits is being conducted under the joint program of the United States International Corporation Administration (ICA) and the Philippine Council for U. S. Aid (PHILCUSA). It is expected to be completed in a few months.

Vanadium Corp. Takes Up Rhodesian Mining Rights

Vanadium Corporation of America has exercised its option to buy a manganese mining concession in Northern Rhodesia, and production at the properties will meet all of the company's manganese requirements. The new property, to be called Bahita Mines, will be operated by Rhodesian Vanadium Corporation, a Vanadium subsidiary. It comprises more than 200 square miles and was purchased from the Weedon interests of Johannesburg, Union of South Africa.

Mining operations will be on a low-cost basis, since large tonnages of high grade ore are believed to exist. Vanadium Corporation's manganese requirements have steadily risen in the past few years, because of the addition of ferromanganese, silicomanganese, and manganese foundry alloys to the company's "Vancoram" products.

National Lead Forms Australian Subsidiary

The National Lead Company has formed an Australian subsidiary known as Mineral Deposits Pty. Ltd. The subsidiary acquired the mine, plant, and leases of Mineral Deposits Syndicate, and will be owned 80 percent by National Lead and 20 percent by the previous owners. The acquired beach leases, concentrator, and separation plant are located at Southport on the south coast of Queensland; additional leases are held in New South Wales.

Mineral Deposits Pty. will export increasing quantities of rutile and ilmenite, and, in addition, zircon and monazite. National Lead has produced these minerals in Australia since 1934 through its subsidiary, Titanium Alloy Manufacturing Company Ltd., which has leases and concentrator at Cudgen in northern New South Wales.

Set New Records in Use Of Mining Geophysics

The prospects for the future of mining geophysics are optimistic, reported Sigmund Hammer, chairman of the standing committee on geophysical activity, at the 25th anniversary meeting of the Society of Exploration Geophysicists at Denver, Colorado in October.

Geophysical explorations in the mining industry rose to new record highs in the first half of 1955, he said. Increases were reported both in total expenditures and in numbers of professional geophysicists employed in exploration surveys. Research in mining geophysics dropped slightly in number of man-month employed, but rose to new heights in expenditures. Canada continued in the lead with the highest capital investments in mining geophysics and also surpassed the United States in the number of professional geophysicists employed.

The magnetic method, including both airborne and ground operations, continued in first place among the various geophysical methods in use. Aeromagnetic operations decreased 50 percent over the average rate in 1954; this decline was offset somewhat by large increases in ground magnetic activity. The electromagnetic method, including both airborne and ground operations, recorded a slight decrease in man-power utilization but a very great increase in expenditure and continued in second place in both categories.

The greatest percentage increase both in expenditure and in man-power was reported in the use of miscellaneous methods, principally Telluric. The largest percentage decrease in expenditure was recorded for the seismic method.

Boliden Subsidiary Gets African Prospect Rights

A concession for exclusive mineral prospecting rights in parts of the Portuguese West Africa territories of Angola and Mozambique has been granted Sociedade Boliden de Mocambique Ltda., a subsidiary of the Swedish firm Bolidens Gruv AB. Terms of the contract do not include radioactive minerals, tantalum, beryllium, or zirconium.

The areas are in the district of Mocamedes on the Atlantic coast of Angola and in the district of Beira (Manica) in Mozambique. Rent will be estimated at a minimum of 4 percent of the annual mineral production, and intensive prospecting must be carried out for five years, at the end of which period the contract may be renewed. The concessionaire has the right to explore for 50 years any mine of mineral substance already indicated and for which a claim has been registered during the 5-year prospecting period.

UNION OF SOUTH AFRICA—Attention is currently being centered on the area east of the *Stilfontein*, *Hartebeestfontein*, and *Buffelsfontein* mines in the Klerksdorp area of the Transvaal. Rights over a large tract of ground have been acquired, through a subsidiary, by one of the smaller mining companies, *New National Base Metal Corporation Ltd.* The venture is still in the speculative stage.

FEDERATION OF RHODESIA AND NYASALAND—*New Consolidated Gold Fields Ltd.* and *Mwinilunga Mines Ltd.*, a company of the *Rhodesian Selection Trust* group, have concluded an agreement whereby the prospecting subsidiary of the New Consolidated company will prospect in an area of 19,000 square miles along the borders of Belgian Congo and Angola in Northern Rhodesia. The program will extend over a period of four years.

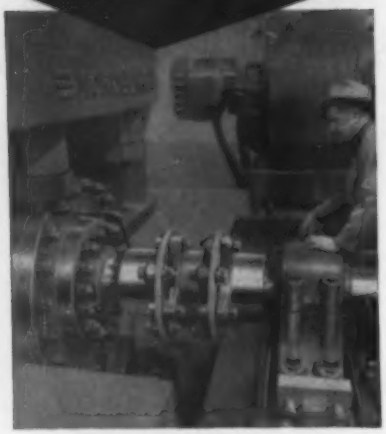
UNION OF SOUTH AFRICA—*Afrikander Lease Ltd.*, associated with *Central South African Lands and Mines Ltd.* and *Tanganyika Central Gold Mines Ltd.*, has applied for a mining lease over 144 claims on the farm Rhenosterhoek 52. This mine, which is a declared uranium producer, has extended its exploration to other properties in the vicinity and drilling is taking place on the farm Rietkuil 86 where it is reported that encouraging results are being obtained. On other portions of the farm Rhenosterhoek 52, *Klerksdorp Consolidated Goldfields Ltd.* is conducting underground and drilling exploration. The property of *Dominion Reefs (Klerksdorp) Ltd.*, also a uranium producer, lies immediately south of the Rhenosterhoek farm.

FEDERATION OF RHODESIA AND NYASALAND—The output of cobalt in August 1955 at *Rhokana Corporation's* cobalt plant (Northern Rhodesia) set a new record recovery of 113,098 pounds of cathode metal and 57,750 pounds of cobalt in carbonate. If this production level could be maintained, the annual output from the plant would be 2,050,000

Rhodesian Lithium Deposit Supplies Texas Plant

This is the large high-grade lithium ore deposit at Bikita, Southern Rhodesia, in which American Potash & Chemical Corporation owns a substantial interest, along with Selection Trust Ltd. and The American Metal Company, Ltd. The participating companies are currently investing over $2,000,000 in this project which is operated by Bikita Minerals (Private) Ltd. The main quarry is in the left center, with other slot mining sites shown to the right of the quarry. American Potash is constructing a plant for the manufacture of lithium chemicals near San Antonio, Texas, and stockpiling of Bikita lithium ore has already started at the plant with the first shipment of nearly 11,000 tons. The facility is owned by a new firm, American Lithium Chemical Inc., in which American Potash holds 50.1 percent of the stock and Bikita Minerals the remainder.

Specify THOMAS ALL METAL FLEXIBLE COUPLINGS for Power Transmission to avoid Costly Shut-Downs

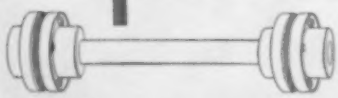


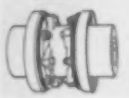
For regular industrial applications as well as those extra tough jobs in heavy industry.

Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

DISTINCTIVE ADVANTAGES

FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.





Thomas Couplings are made for a wide range of speeds, horsepower, shaft sizes and can be assembled or disassembled without disturbing the connected machines, except in rare instances.

Write for new Engineering Catalog No. 51A

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA, U.S.A.

pounds which would be higher than the total production of the United States and just short of the combined production of Canada and Newfoundland. By comparison, it should be noted that the annual figure of the Belgian Congo mines is nearly 19,000,000 pounds. Rhokana also established new copper production records in August. Electrolytic copper production totaled 13,111 tons (previous record was 12,003 tons in May 1954), while 16,282 tons of copper shapes made from the product of the tank house were cast during the month, as compared with a previous record of 15,512 tons in May 1955.

MOROCCO—In the first half of 1955, Moroccan mines produced the following tonnages compared with the same period of 1954: phosphates—2,705,000, compared with 2,560,000; lead—62,000, compared with 55,000; zinc—38,000, formerly 29,000; manganese—185,000, formerly 188,000; iron—124,000, formerly 187,000; cobalt—3,700, formerly 3,400; antimony —300, formerly 300; copper 1,300, formerly 1,200.

UNION OF SOUTH AFRICA—*Hartebeestfontein Gold Mining Company Ltd.*, which will extend its reduction plant capacity exentually to 100,000 tons a month, has been declared a uranium producer. An immediate start has been made on the erection of a uranium extraction plant with a treatment capacity of 100,000 tons monthly. The plant is expected to be in operation by the end of 1956. Gold production started in July with 44,000 tons milled for a recovery of 6.704 dwt. In August 46,000 tons were milled with a yield of 7.816 dwt. The mine was brought to the producing stage in the short space of 2½ years. The company's lease area extends over 4,911 claims, in which drilling results have indicated an average of 300 inch-dwts. This is somewhat lower than that of the reef development values so far disclosed, but the nature of the Vaal Reef suggests that higher values may be found in the actual opening of the orebody.

FEDERATION OF RHODESIA AND NYASALAND—Discussions are now in progress between the Rhodesian government and *Messina (Transvaal) Development Company Ltd.* over establishment of a new company which would operate the Que Que iron works, now under the jurisdiction of the *Rhodesian Iron and Steel Commission*. At the same time, discussions are also going on in London, where Southern Rhodesians are meeting with British financiers over the problem of expanding Que Que's production rate to 200,000 tons a year. This would be sufficient to satisfy local demand, and would allow for shipment of 100,000 tons to the United Kingdom annually. The main iron ore deposit in Rhodesia is said to be owned by the government and the Messina firm.

NIGERIA—The government of Nigeria has agreed to participate financially in bringing *Mines Development Syndicate (West Africa) Ltd's* property to a production basis. The government will underwrite up to £350,000. Meanwhile, underground development is in progress on the Syndicate's Ameri ore body, the present program's objective being to expose ore on the 150-foot and 250-foot levels already indicated by diamond drilling.

SOUTH WEST AFRICA—A prospecting expedition of *Kimberley West Diamond Corporation Ltd.* has started operations in the corporation's concession area of about 25,000 square miles immediately south of the Kunene River, which forms the boundary between Angola and South West Africa.

SASKATCHEWAN — Pitching Lake, about 80 miles west of Flin Flon, is now the scene of a potentially large copper strike. *Glenn Uranium Mines* has paid $500,000 cash for an interest in the 50 claims of *Pioneer Contractors* who did most of the original work in making the discovery. Glenn has also acquired a 20 percent interest in 350 claims. Arrangements are being made to have six drills on the property and electromagnetic and geophysical surveys will be made during the winter.

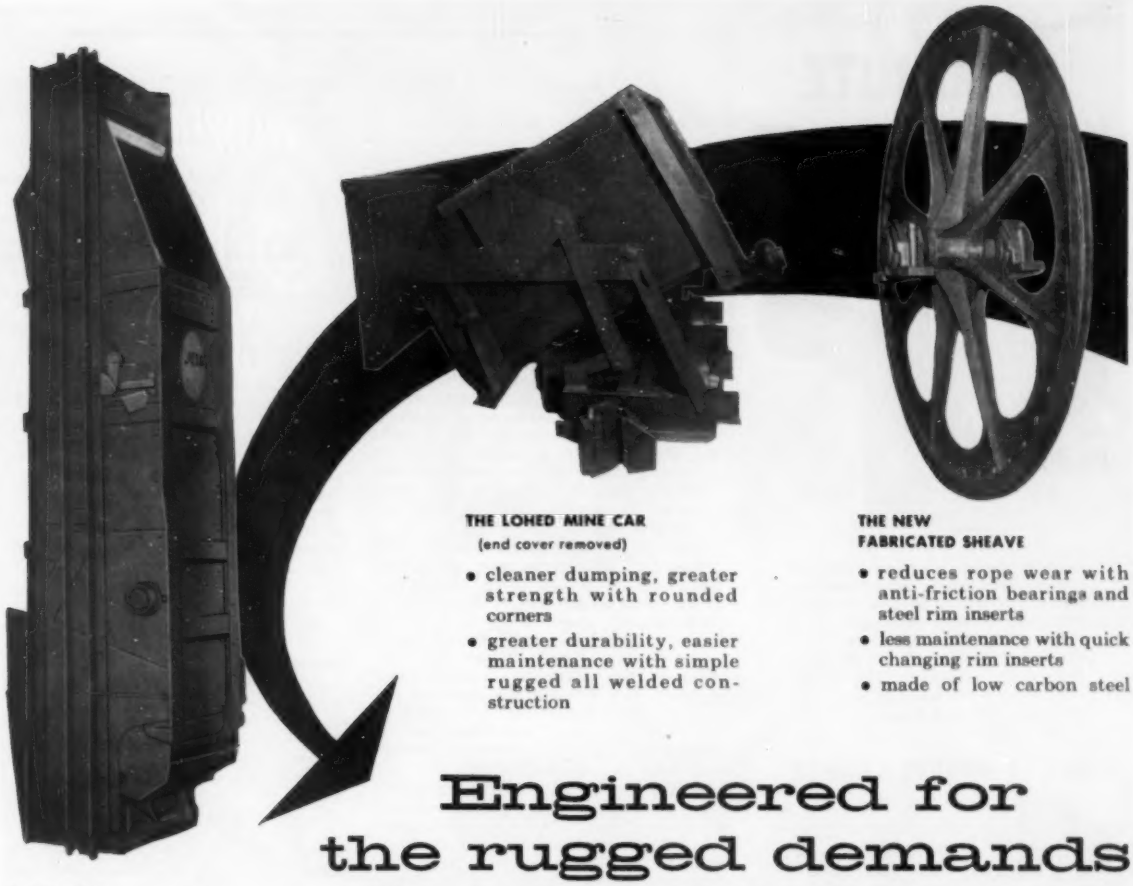
ONTARIO—*Canadian Johns Manville Company* is steadily sinking its shaft at the rate of 175 feet a month at its *Munro* property near Matheson, Ontario, and expects to reach the full depth of 860 feet by the end of this year. Development of the 750-foot level is expected to take two years, and in the third year it is planned to change over completely from open pit to underground mining. Meanwhile, the pit on "A" orebody is producing between 2,000 tons of good grade, and 2,800 tons of low grade ore per day. Three tons of waste are mined with each ton of pit ore. The pit is now 200 feet deep in places, more than 500 feet wide, and 1,800 feet long. Three more lifts are to be taken bringing it to the final depth of 300 feet. Continuation of the ore body to 750 feet is pretty well indicated by diamond drilling.

QUEBEC—*Copper Cliff Consolidated Mining Corporation* has undertaken a $2,500,000 exploration and development program which includes erection of buildings, equipment and headframe, and sinking of a five-compartment shaft to a depth of 1,000 feet. The company's property is in the Chibougamau area. The shaft is designed to handle ore from the adjoining property of *New Royran Copper Mines*, as well as its own ore. Present plans call for connecting the Copper Cliff shaft with the New Royran shaft at a deep level.

BRITISH COLUMBIA—*Hewitt-Robins, Inc.*, has received an order for a 3-mile conveyor system to move sand and gravel required in the building of a new addition to the *Aluminum Company of Canada* plant at Kitimat. The system will consist of 14 conveyors, each 800 to 1,500 feet long, linked together to provide continuous movement of the material from a sand and gravel hill to the plant site. The material will be used as "fill" to raise the site approximately 20 feet and provide proper soil conditions for the addition. The site is approximately 1,600 feet by 3,200 feet.

ALASKA—A group of uranium prospectors from Fairbanks report that they have made a rich uranium strike on Seward peninsula, about 180 miles northeast of Nome. George Lilly, Burt Beltz, Bill Beltz, and Maurice Steffe comprise the group. Some of the samples have been quite promising.

NEWFOUNDLAND—*Bathurst Mining Company* has shipped its first copper ore



THE LOHED MINE CAR
(end cover removed)

- cleaner dumping, greater strength with rounded corners
- greater durability, easier maintenance with simple rugged all welded construction

THE NEW FABRICATED SHEAVE

- reduces rope wear with anti-friction bearings and steel rim inserts
- less maintenance with quick changing rim inserts
- made of low carbon steel

THE "JETO" BOTTOM DUMP SKIP

- less dead load, greater pay load with lightweight aluminum and steel construction
- increased production with cleaner faster dumping action
- Lighter less expensive headframe construction due to greatly reduced headframe travel
- greater safety with positive dumping action and body safety latch

Engineered for the rugged demands of metal mining!

For close to 100 years Lake Shore has focused its seasoned engineering attention on developing equipment to make metal mining operations more efficient and safer. Excellent results of that continuous effort are the "Jeto" bottom dump skip, the new fabricated sheave, and the all welded "Lohed" mine car; useful developments that have achieved increased production, lower maintenance costs, and longer equipment life for the metal mining industry. Write for detailed product bulletins.

LAKE SHORE
Engineering Company

Plants: Iron Mountain and Marquette, Michigan

Branch Offices: Denver • Chicago • New York • Detroit • Phoenix
San Francisco • Milwaukee and Ishpeming

Underground cars • skips • cages • trestle cars • sheaves
grizzlies • snatch blocks • hoists • mills • special equipment

The diaphragm pump with the

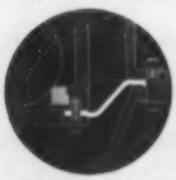
10 MINUTE PARTS CHANGE

It can be opened, all wearing parts replaced, and the pump reassembled in a total of less than 10 minutes. Simplicity makes the Wemco Diaphragm Pump an operator's first choice among pumps for controlling and metering the underflow of thickeners, clarifiers and hydroseparators. It can serve anywhere for accurately measured pumping of thick solids at low head.

THE 10 MINUTE CHANGE

Removal of six bolts from slots around the bowl opens the pump.

Upper section of the bowl lifts. Removal of four cap screws releases the diaphragm from the plunger.



Reassembly is easy because the diaphragm is held by compression between upper and lower bowls. There are no holes to match.

Sizes, capacities, special types and convenient operating features are fully described in available Wemco literature. Write for your copy today.

WEMCO
WESTERN MACHINERY COMPANY

760-8 Folsom Street · San Francisco 7, California

Representatives throughout the United States and Canada and in major countries around the world.

from an old mine near Notre Dame Bay which is part of the *M. J. Boylen* mining interest. (Bathurst is a subsidiary of Boylen.) The copper shipment was reported to be the first to leave Newfoundland in 36 years. A new pier is being constructed and a concentration plant is being erected at the mine.

QUEBEC—*Titanium Development Corporation* is shipping ilmenite from its *Ivry Nord* property to a small pilot mill in Cleveland, Ohio, under a recent contract signed with *Horizons Inc.* The latter has erected the pilot mill within its Cleveland plant and is conducting tests in an attempt to develop the Ivry Nord titanium-iron into commercial products. The Titanium Development property covers 142 acres 67 miles northwest of Montreal. A pit has been opened and the ilmenite is being trucked to a nearby crusher for processing. Early drilling indicated over 3,000,000 tons of ilmenite in four zones assaying 34 percent titanium oxide and 44 percent iron.

BRITISH COLUMBIA—*Silver Hill Mines Ltd.* expects to start production this month at its new 50- to 60-ton mill in the south central part of the province. Underground work is on a two-shift basis. At the lower end of the Arrow Lakes, *United Estella Mines Ltd.* has optioned the *Mountain Chief* copper prospect. The firm has also optioned the *Copper Queen*, a new discovery north of Merritt. Both have promising surface showings and as much work as possible is planned on each this season.

ALASKA—*Cyprus Mines Corporation* is reported to be interested in the mineral potential in Alaska and has sent a geologist, William Lundeen, to the territory on a reconnaissance mission. One of the areas he checked was the William Henry Bay mining discovery site staked by six Juneau men. Mr. Lundeen indicated that his firm was interested in all minerals, not principally uranium.

MANITOBA—*Violamac Mines* is preparing plans for an underground program at its *Cat Lake* property 85 miles northeast of Winnipeg. Drilling has indicated about 4,000,000 tons of ore averaging 1.28 percent lithia. Sinking of a 1,000-foot production shaft will probably start before the end of this year, to be followed by a second shaft on what is known as the north zone.

ONTARIO—After receiving a contract to sell $182,250,000 worth of uranium precipitates to the government-owned *Eldorado Mining and Refining Company*, *Consolidated Denison Mines* has started sinking its huge No. 2 shaft. The shaft is scheduled to be about 2,600 feet deep, with an opening greater than 28 feet by 16 feet in area. The ore horizon will be cut at 2,400 feet in this shaft. The No. 1 shaft, currently being sunk, is to be 1,750 feet deep, and will intersect the main ore at 1,560 feet. Detailed mining plans are still in the formative stage.

BRITISH COLUMBIA—A low-level tunnel being driven by *Sheep Creek Gold Mines* at its *Mineral King* lead-zinc mine in the Windermere district found lead mineralization at the 700-foot point. At approximately 1,500 feet, a raise will be driven up under ore being mined from a tunnel 750 feet higher. At last report, the firm was planning to truck between 30 and 40 tons of ore daily from its *Paradise* mine to the Mineral King mill. It has optioned some of its *Wagner* claims in the Lardeau district to *Granby Consolidated Mining, Smelting and Power Company*. H. E. Doelle is managing director.

ALASKA—*American Metal Company* is reported to have filed corporation papers to do business in Alaska, naming Juneau as the principal office.

NEW BRUNSWICK—Four mining companies have joined in providing funds for *Miramichi Mines* so that it may undertake promising exploration work in the Newcastle-Bathurst area. Miramichi holds a block of 50 claims east of the important *American Metals Company* ground now being developed by a subsidiary firm, *Heath Steel Mines*. The four companies are *McIntyre Porcupine*, *Teck-Hughes* (through its subsidiary *Teck Exploration*), *N.A. Timmins (1938) Ltd.*, and *Consolidated Howey*. *Kirkland Lake Gold* and *Northern Canada* are participating in the Consolidated Howey share. Each of the four firms is purchasing 100,000 shares. A contract has been let to *McPhar Geophysics* for a geophysical survey of the property. Miramichi also holds a second group of calims about 10 miles west and south of the American Metals property.

BRITISH COLUMBIA—*Deer Horn Mines, Ltd.* has found scheelite at its gold-silver-mine in the Kitimat area. W. Tattrie is manager.

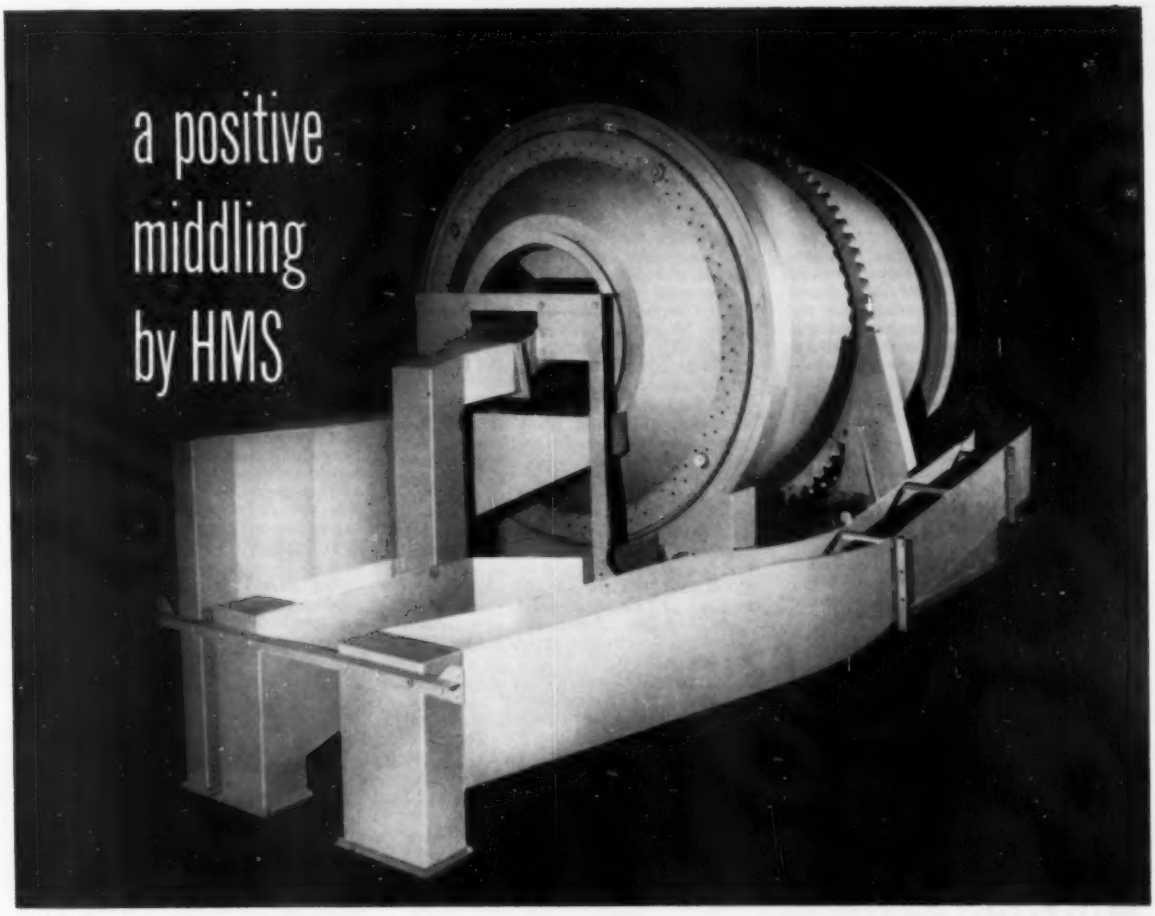
ALASKA—*Asbestos Corporation (Exploration) Ltd.* has an option to purchase 27 claims on Ibex Mountain in Hyder precinct. High-grade chrysolite asbestos reportedly has been found there.

REPUBLIC OF THE PHILIPPINES—*Palawan Quicksilver Mines, Inc.* produced its first mercury in September, after its 100-ton mill made trial runs in August. A part of the output was purchased by a local company, *Caltex Philippines, Inc.*, for use in its petroleum refinery in Batangas province. It was reported that future production will be shipped to Japan; an agreement to purchase the whole of the output was signed recently by Japanese buyers who made an inspection of the Palawan mine.

NEW SOUTH WALES—*Tungsten Consolidated N.L.* has taken a one-third interest in a company being formed to operate beach leases at Lennox Head. The leases are small, but of high grade, and contain 25,000 tons of rutile. When the plant is delivered, the production rate is expected to be 200 tons of rutile monthly.

INDONESIA—An Indonesian merchant from Djakarta is reported to be developing sulphur-pyrite deposits in the Kaloran Mountains near Temanggung (Java) and sulphur deposits near Teras Lake (Wonosobo, Java).

REPUBLIC OF THE PHILIPPINES—*Hixbar Gold Mining Company* expects its copper mines at Rapu Rapu in Albay province to be in production shortly, following installation of a processing plant. The *Rapu Rapu* property includes 44 claims of nine hectares each; so far only three have been developed, and the management is currently negotiating for addi-



WEMCO IMPROVES YOUR CONCENTRATES AND LOWERS YOUR TAILING LOSSES BY AN EXCLUSIVE TWO GRAVITY SEPARATION TECHNIQUE

With Wemco's Two Compartment Drum Separator, a successful middling product from HMS is not just a shakey promise — it's a sure thing. Use of two different separating gravities is the right way to do the job *when you eliminate cumbersome duplicate equipment.* Wemco has developed a two gravity technique that uses little more equipment than a single stage.

Wemco's Two Compartment Drum Separates three products, each with a bonus to you:

1. **YOU UPGRADE THE CONCENTRATE** because one of the separating gravity baths can be chosen to keep out all the middling values.
2. **YOU REDUCE THE TAILINGS** because the other separating gravity bath is independent and can be selected to keep all the remaining values in the middling for reprocessing.
3. **YOU PROFIT BY THE MIDDLINGS** because by recrushing you can save much that otherwise would be lost.

Wemco's positive two stage heavy media separation method is fully explained in available literature. To learn what this can do for your plant, write today for your copy.

WEMCO®
WESTERN MACHINERY COMPANY

760-B Folsom Street • San Francisco 7, California

Representatives in principal cities of the United States and Canada and in major countries throughout the world.

tional capital to develop the others. A consulting geologist is said to have estimated the property to contain about 305,398 tons of reserve ore averaging 3 percent copper.

WESTERN AUSTRALIA—*Gold Mines of Kalgoorlie Ltd.*, which has already taken over *South Kalgurli Consolidated Ltd.*, *Boulder Perseverance Ltd.*, and *Kalgoorlie Enterprise Mines Ltd.*, has now offered to take over *New Coolgardie Gold Mines N.L.* on a basis of 28 GMK shares for every 100 New Coolgardie. The ore from the small New Coolgardie mine will be more profitably treated in the extended GMK mill, which is being expanded in capacity from 15,000 tons per month to 38,000 tons. Results of exploration at the southern end of the Kalgoorlie gold field by *Kalgoorlie Southern Gold Mines N.L.* warrant continuation of test drilling. The best opportunity for ore occurrence is said to be in an area of very severe distortion and this has been encountered in diamond drill hole No. S.E. 7. The broken nature of the core from this hole is more marked than in the case of previous holes. In addition, rocks exposed on hills to the west of this hole have been extensively altered by carbonate solutions, which is also a favorable feature. The hole is currently at 5,600 feet.

REPUBLIC OF THE PHILIPPINES—The Agriculture Undersecretary, Jaime N. Ferrer, has recommended that the Bureau of Mines lease its diamond drilling machines to the *Atlas Consolidated Mining and Development Corporation* so that the corporation may continue the exploration of its copper property at Toledo, Cebu island. The equipment would be used to determine the depth of the deposit so that the mining firm would be able to plan underground development of the ore bodies.

NORTHERN TERRITORY—*Uranium Development and Prospecting N.L.* is negotiating with *North Australian Uranium Corporation N.L.* to amalgamate the South Alligator River area interests of the two companies. Ore already proved would enable a decision to be made regarding a treatment plant if agreement is reached. *Atlas Corporation* (United States) which holds 50 percent interest in N.A.U.C., will arrange for an expert from the United States to advise on the site and building of the plant.

TASMANIA—The Commonwealth government's aluminum plant at Bell Bay was officially opened on February 23, although it has been in partial operation since February (see MINING WORLD, April 1955, page 61). Final cost of the plant was stated to be £A11,000,000. Ingot capacity is 13,000 tons per year, but because of shortages of hydroelectric power, the first year's output is expected to be 6,000 tons and the second year 10,000 tons. A. J. Keast, general manager of the *Australian Aluminium Production Commission*, who was appointed in 1951, has now retired.

INDONESIA—A 1,000-ton shipment of managanese ore was exported to Europe from the harbor of Tjilatjap in central Java recently aboard the S.S. Teucer.

WESTERN AUSTRALIA—A newly formed gold mining company is *Haoma Gold Mines N.L.* at Mount Monger, 32 miles east of Kalgoorlie and linked with that city by an all-weather road. To May of this year, operators of the mine had removed 15,300 tons of ore for 16,611 ounces gold. High gold values are reported to exist to the full depth so far mined (515 feet).

REPUBLIC OF THE PHILIPPINES—*Palawan Consolidated Mining Company* was incorporated recently, with *Marsman and Company* serving as managing agents in charge of operations. The properties of the new firm, known as the *Irahuan* chromite and *Sugod* quicksilver properties, are located in Puerto Princesa, Palawan. The chromite properties are divided into the *Macasaet* and *Venture* groups. The Macasaet property consists of nine lode claims an area of 81 hectares, while the Venture deposit is covered by four lode claims situated on the northeast slope of Mt. Beaufort, about two kilometers from the Macasaet group. The quicksilver property consists of 22 lode claims and two placer claims, covering an area of approximately 198 hectares situated in the vicinity of Sugod and Subnayao, barrio Tagburos, in Puerto Princesa. The property is approximately three kilometers west of the *Tagburos* quicksilver property owned by the *Palawan Quicksilver Mines, Inc.*, another Marsman subsidiary.

EUROPE

FRANCE—Formation of the *Compagnie Francaise des Minerais d'Uranium* has been announced in Paris. It was founded by *Rothschilds Freres* in conjunction with mining and chemical firms including *Penarroya*, *Ste Le Nickel*, *Etablissements Kuhlmann*, *Pechiney*, *Compagnie des Mines de Huaron*, and *Minerais et Metaux*. Fifteen percent of the initial capital of 400,000,000 francs have been subscribed by the State Atomic Energy Commission. The firm will prospect, mine, and process deposits of fissionable materials in France and abroad.

NORWAY—The last 80 furnaces have been put into operation at the *Sunndalsora* aluminum plant in western Norway, bringing production there to 40,000 tons per year. The plant, operated by A/S *Ardal Verk*, may be enlarged to a capacity of 80,000 tons in the near future. Expansion at the plant, which now has 264 furnaces in operation, was paid for in part by a loan from the *United States Foreign Operations Administration*, to be repaid in deliveries of aluminum over a 10-year period. A/S Ardal Verk also operates the *Ardal* aluminum plant, which has an annual capacity of 30,000 tons.

YUGOSLAVIA—Ore and metal production for the first half of 1955 is generally higher than 1954 production. Lead-zinc production is rising. The *Mezica* lead smelters in Slovenia have purchased two *Kurz-Trommelofen* short drum furnaces to replace the present Newman-hearth method, and at the *Celje* zinc smelters the 1,500-ton-per-year zinc-oxide plant's capacity has been doubled. Although power supply is still short, the new electrolytic zinc plant at Sabac, Serbia is scheduled to begin operations at the end of this year. Copper production has been lagging behind 1954, and grade of ore produced has been somewhat poorer. The *Majdanpeck* prospect has been discontinued because of a capital shortage. Operations have started, however, at the copper and bass rolling plant in Sevojno, Serbia, and production of 10,000 tons is anticipated there. Aluminum production for 1955 is expected to be three times that of 1954. Alumina production from *Kidricevo*, *Lozovac*, and *Moste-Ljubljana* is now up to 45,000 tons per year, and more than half of it is being exported. The old rolling plant at Slovenska Bistrica, Slovenia is changing over from copper and brass to aluminum rolling. Chromite production is about the same as last year, and the new *Jogunovci* plant has started producing sodium bichromate. Following is a table showing production figures for 1954 and the first half of 1955:

Yugoslavian Ore and Metal Production in Metric Tons

Commodity	1954 (January-December)	1955 (January-June)
Lead-Zinc (ore)	1,484,522	816,539
Copper (ore)	1,298,860	684,922
Antimony (ore)	75,258	40,917
Bauxite	686,689	347,114
Chromite	124,480	62,059
Iron (ore)	1,110,743	607,944
Refined Lead	66,729	37,729
Zinc (metal)	13,644	7,257
Blister Copper	30,295	13,329
Electrolytic Copper	26,946	11,078
Antimony (metal)	1,552	780
Mercury	498	255
Aluminum	3,496	5,003
Bismuth	110	60
Silver	88	44

POLAND—Extensive iron ore deposits have been reported by prospecting parties. Domestic production is now between 2,500,000 and 3,000,000 tons per year.

WEST GERMANY—It is reported that a group of German steel merchants have

URANIUM and OIL
PROSPECTING
GEIGER and SCINTILLATION COUNTERS for EVERY PROSPECTING APPLICATION

AIRCRAFT
For the quickest, proven method of prospecting — from aircraft . . . The RADIAC Company recommends the up-to-the-minute "CARDINAL"—$2420.00

VEHICULAR
For prospecting from a moving vehicle — the "NUCLEOMETER"—$545.00

DEEP DRILL HOLE
For accurate gamma ray measurements in drill holes down to 4000 feet for Oil or Uranium—the Super Sensitive "SCINTILLOGGER"—$2350.00

ON FOOT
Probably the most dependable Geiger Counter you can buy at any price for on-foot prospecting — Model DG-7 GEIGER COUNTER—$135.00

SEND FOR FREE CATALOG FROM THE WORLD'S LEADING SUPPLIER—Dept. MW-9

THE RADIAC CO., Inc.
489 Fifth Avenue, New York 17, N. Y.

been in Moscow recently negotiating for new pig-iron contracts with the USSR. During the first half of 1955, West Germany imported 1,300,000 tons of rolling mill products and exported 1,000,000 tons. Proposals have been made to effect a continuous work week in the steel industry, which would add an estimated 1,600,000 tons per year to German steel output.

ENGLAND—Imports of iron ore into the United Kingdom in August reached a record 1,250,000 long tons. Production of pig iron is rising, but demand is still very great and imports are continuing on a heavy scale. A delegation of British steel experts is expected to visit Russian steelworks in the near future as a follow-up to the Soviet group which toured the British industry last December.

NORWAY—*Norsk Jernverk A/S*, operator of the *Mo i Rana* steel plant, estimates that next year's production will total 250,000 tons electric pig iron. The fourth electric furnace is now in operation at the plant.

YUGOSLAVIA—A second furnace will be put into operation toward the end of this year at the *Zenica* steel works in Bosnia. Since October 1954 the first 700-tons-per-day furnace has been operating. A third furnace is now under construction.

SPAIN—The *Direccion General de Minas* has authorized installation of a quicksilver distillation plant in Castaras, Granada province. Two Spanish designed and constructed furnaces will be installed, and the plant is expected to be ready for operation within twelve months. Spain has only one quicksilver distillation plant now in operation, the *Minas de Almaden*, state-owned operation, which recently purchased a plant from *Pacific Foundry Company, Ltd.*, San Francisco, California. (See June 1955 MINING WORLD, pages 50-54, for details on the Almaden plant).

CORNWALL—*Geevor Tin Mines, Ltd.* has signed a £30,000 contract for disposal of its remaining flotation residue dump, thereby increasing actual mine profit over what would have been derived from current mining operations. During the year ending March 31, 1955, £50,868 were obtained from flotation residue dump disposal. In the future the remaining dump is expected to be relatively small.

WALES—A large mining concern is said to be interested in reviving copper production on the Island of Anglesey, off the coast of North Wales.

CORNWALL—Tailings from tin and copper workings during the last century in the Carnon Valley near Truro are being sampled by a British firm, and means are being sought to economically recover tin concentrate.

TURKEY—The *Eti Bank* and the *Anglo-Chemical and Ore Company Ltd.* have negotiated a contract for the development of the copper deposit at Murgul; however, the contract must be approved by the Turkish and British governments. The English firm will send equipment which is expected to increase production at Murgul by about 25 percent.

CHINA—Current reports indicate that Communist China is developing two new steel centers which, by 1962, should increase her output to 10,000,000 tons a year. The new steel centers are planned for Wuhan in central China, and Paotow in inner Mongolia. The work will be started under the current five-year plan, with Soviet help, and is scheduled for completion at the end of the second five-year plan period—about 1962. Paotow is said to have large deposits of iron, coal, and fire resistant materials. Mine shafts are currently being sunk.

MALAYA—*Kuala Kampar Tin Fields Ltd.* has sold its No. 3 dredge to *Berjuntai Tin Dredging Ltd.* for £80,000 in cash. The earning capacity of Kuala Kampar is not expected to be affected by this sale because the No. 2 dredge has been responsible for an average of 67 percent of the company's profits during the last six years; No. 1 and No. 3 dredges accounted for only 33 percent. No. 3 dredge had also worked out the area covered by a tribute agreement with another firm, and insufficient reserves were available to keep all three dredges occupied.

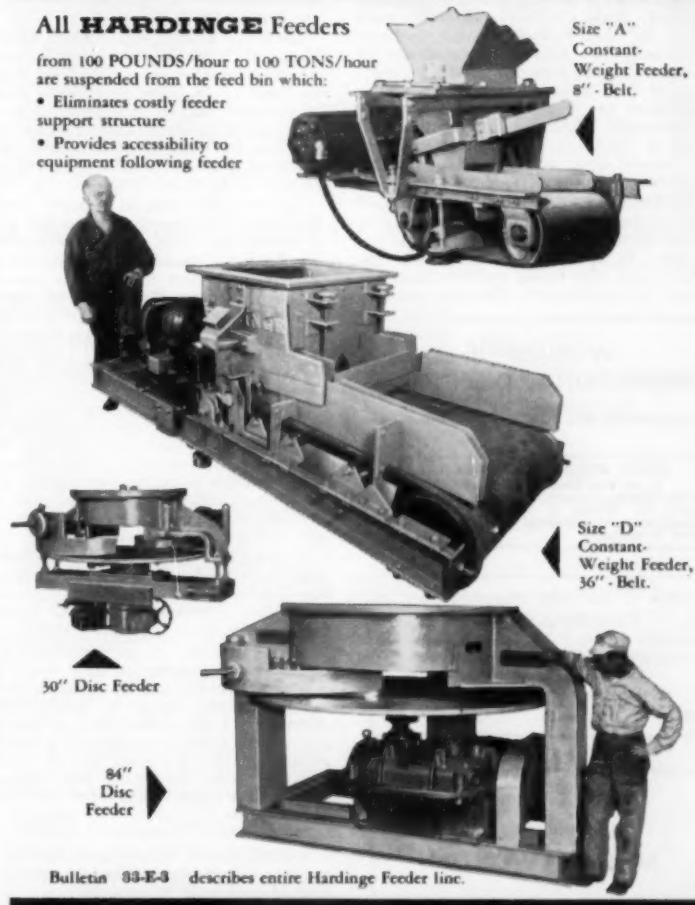
ISRAEL—The discovery of another of King Solomon's copper mines in the Negev desert has been announced. The discovery was made in a valley eleven miles north of Israel's Red Seaport of Elath. It is believed to be the largest of the mines and refineries found so far, covering about 25 acres "dotted with furnaces."

LOW INSTALLED COST

All **HARDINGE** Feeders

from 100 POUNDS/hour to 100 TONS/hour are suspended from the feed bin which:

- Eliminates costly feeder support structure
- Provides accessibility to equipment following feeder



Bulletin 33-E-3 describes entire Hardinge Feeder line.

HARDINGE COMPANY, INCORPORATED

YORK, PENNSYLVANIA • 240 Arch St. • Main Office and Works

New York • Toronto • Chicago • Hibbing • Houston • Salt Lake City • San Francisco

INDIA—The government of India has no plans for taking over the manganese mines in Madhya Pradesh, presently in the hands of foreign companies, says Mr. Malviya, Minister for Natural Resources and Scientific Research. The minister was asked whether, in view of the growing needs of manganese for the country's steel plants, the government contemplated nationalizing these high-grade mines.

THAILAND—The *Kamunting Pangnga (Siam)* No. 2 dredge, equipped with 8¾-cubic-foot buckets, started production in the Bangtoe area on July 1. This dredge worked out its leases on the Pangnga property in February 1952 and is the first of the two Pangnga dredges to be transferred to this new area. The Bangtoe property is estimated to contain some 57,000,000 cubic yards of dredgeable ground with an average tin content of 0.56 pound per cubic yard.

TURKEY—The German firm of *Krupps* has sent two geologists to Turkey to study scheelite deposits in the Uludag Mountains. Together with the *Eti Bank*, Krupps is interested in mining this large scheelite deposit. Some drilling and other work done by the Turkish Mining Institute reportedly has proved the existence of about 6,000,000 tons of ore with an average of 0.48 percent WO_3. The mining conditions are said to be good. A scheelite-antimony deposit near Sogut, northwest of Eskisehir, has been investigated by several firms and proved to be uneconomical to develop.

BURMA—The Burmese government has undertaken a mineral production drive in order to increase foreign exchange. In order to be successful, this will require the fullest collaboration between the government, the mine owners, the latter having suffered grevious losses since 1949, and many of the mines will have to be reorganized. Every assistance will have to be made for the recruitment of foreign engineers and technicians, together with competent workers, without which it is doubtful whether mineral production could be increased.

PAKISTAN—A sulphur purification plant is under construction in Quetta. The plant is said to be the first of its kind in Baluchistan. When completed and in full operation, it will meet the entire demand for purified sulphur in Pakistan. Production is expected by the first of the year.

MALAYA—Negotiations have recently taken place between officials of *Kramat Tin Dredging Ltd.* and *Banir Rubber Estates Ltd.* regarding an agreement made in August 1951 for mining the Banir Area. Experience has shown that the agreement has proved to be unworkable because of altered conditions, and an offer has been made, therefore, to purchase 637 acres of Banir Rubber Estate for the sum of £175,000. The latter has accepted the offer.

HONG KONG—A British soldier, Corporal Bruse Harries, has discovered what is described as a rich beryl deposit on Devil's Peak in the Hong Kong area. It is reported that he has decided to sell the mine to a Hong Kong Chinese mining firm for more than £5000 as down payment, plus a salaried managerial post, as soon as he is released from the Army.

JAPAN—The *Daiichi Bussan Trading Company* has merged with another group to restore the huge pre-war *Mitsui Bussan Trading Company*. The new firm will start business next April and is expected to handle about 15 percent of Japan's export and import trade. In 1947, Mitsui Bussan was split into more than 200 small firms.

INDIA—The Indian government has accepted the British proposal to build a $230,000,000 steel plant in India. The plant will have an annual capacity of 1,000,000 tons, and will be the third government-owned project. India has recently concluded similar agreements with Russia and with Krupps of Germany for steel plants. Several sites for the new one are under consideration.

TURKEY—The *Rheinische Industrieplanungs GmbH* of Dusseldorf, Germany has concluded its conferences regarding the mining of iron ore deposits in Turkey. No decisions have been announced.

MALAYA—The Johore government is currently considering an offer made by *Aluminium Ltd.* to develop the 10,000,000-ton bauxite deposit in Johore state. *Aluminium Laboratories, Ltd.*, a subsidiary, already holds a concession for bauxite mining on the southeast tip of Johore between Bukit Pengerang and Tanjong Ramunia. A locally registered firm will probably be set up if the proposal is accepted.

PAKISTAN—A blue sapphire mine has been discovered in the hills of Agror near Mansehra in Hazara district.

INDIA—It is announced that the Indian government has decided to nationalize the British-owned firm of *Hopkin and Williams*, which has been processing ilmenite and monazite in Travancore. Nationalization is also the subject in Mysore state where the government has officially notified the management of the *Kolar Gold Fields* of its decision to nationalize these mines.

WORLDWIDE PROFESSIONAL DIRECTORY

AGENCE MINIERE & MARITIME S. A.
2 rue Van Bree, Antwerp, Belgium
Sworn weighers, samplers, assayers of ores, metals
Agents for shippers to European ports, plants
Market surveyors, commercial advisers assuring sales direct to consumers

JOHN F. MEISSNER ENGINEERS, INC.
Consulting Engineers
Conveyor Systems — Storage Methods
Crushing Plants — Ship Loading Docks
Materials Handling and Processing Plants
308 W. Washington St. — Chicago 6, Ill.

MINING WORLD
First in
Mining News

LATIN AMERICA

MEXICO—*Compania Minera de Guetamo S.A.*, located in the state of Sonora about 200 miles northeast of Hermosillo, will increase the capacity of its flotation mill within the next few months from 100 tons to 360 tons per day. The firm treats its own production of silver and lead ore from company mines, and also does some custom milling. H. Grattan Lynch is president and general manager.

BOLIVIA—The Bolivian Mines Ministry is calling for bids for development of the *Matilda* zinc mine near Lake Titicaca. The mine belonged to *Mauricio Hochschild* group before its nationalization.

BRAZIL—The Department Nacional da Producao Mineral (Brazilian Department of Mineral Production) maintains a permanent group of geologists working in the so-called "scheelite zone" in the northern part of the country. In the district of Serido, state of Rio Grande do Norte, Octavio Santiago is prospecting the Serido river valley and its tributaries —Olho d'Agua and Malhada Grande. The results have been very satisfactory, with 104 holes drilled during the first five months of 1955.

MEXICO—*Beneficiadora y Minera de Copala S.A.*, operating in the Copala mining district in the state of Sinaloa, is currently replacing all its drilling equipment and also making changes in the flow sheet of its flotation plant in order to obtain a better recovery. The capacity of the mill is 50 tons a day, treating lead and silver ores.

CHILE—The two *Anaconda Company* subsidiaries in Chile, *Chile Exploration Company* and *Andes Copper Mining Company*, will invest $38,207,000 to increase copper production and improve living conditions for the firms' workers. The plants at Chuquicamata and Potrerillos will be expanded at a cost of about $20,907,000, increasing Chuquicamata's output by about 100,000,000 pounds a year. At Potrerillos, a new plant will permit refining of about 75,000,000 pounds of copper, now produced as blister copper. About $17,300,000 will be used in building houses, clubs, stores, hospitals, and other welfare projects.

BRAZIL—According to the Diretoria da Producao Mineral, state of Rio Grande do Sul, a new and important copper discovery has been made near Bage in the state. Mining engineers and geologists have already started investigations to estimate the ore reserve.

BOLIVIA—Substantial radioactive deposits have been reported in the Covendo Triangle, located at the junction of the boundaries of the departments of La Paz, Cochabamba, and Beni.

MEXICO—*Minerales y Metales de Mexico S.A.* is making arrangements with the federal and state governments (Durango state) to establish a custom lead smelter with a capacity of 100 tons per day. The smelter will be installed at Guadalupe, Zacatecas. Norbert Linder is general manager of the firm. In the state of Chihauhua, the company has also been investigating some scheelite deposits with good results.

BRAZIL—Recent geological investigations conducted by Brazilian geologists have shown that many areas of the state of Sao Paulo are covered by rich and important deposits of bauxite. The most important reserves occur in Cipo, Curucutu, Cabeceiras de Rio Claro, and Campo Grande. In these areas the reserves have been estimated at 3,000,000 tons. All of the field evidence shows that the bauxite originated by chemical alteration of basic intrusive rocks and anphibolites. Chemical analyses of several samples gave the following results: Al_2O_3, up to 66 percent; SiO_2, less than 6 percent; Fe_2O_3, 8 to 15 percent.

COLOMBIA—During the first half of 1955, *Asnazu Gold Dredging Ltd.* produced 5,359 ounces of fine gold from 566,630 cubic yards dredged. This compares with the same six-month period of 1954 when the firm dredged 1,516,000 cubic yards to recover 6,735 ounces.

BRAZIL—Brazilian engineers believe that production of nickel will soon be possible through the use of Dr. Arikoerner Guerreiro's process. The new process, according to Dr. Guerreiro, is based on the molecular disorder of the ore followed by leaching and electrolysis. Normally, to obtain a ton of nickel-iron alloy by the known processes requires 75,000 kilowatt hours. The new process will need no more than 6,000-kwh to produce a ton of pure nickel. The number of manhours would also be reduced from 1,560 to 550. Until now, Brazil's large nickel reserves could not be developed com-

BRITISH GUIANA—Deposits of monazite have been reported in the Rupununi district adjoining the Brazilian border. A heavy concentration of the mineral is said to have been located in a small river 20 miles long; other deposits are spread over a large area.

ARGENTINA—The government has ordered, through the National Administration of Industries, the installation of several concentrating plants in the Cuyo area. This is the first large-scale attempt to install regional plants for treatment of minerals mined by the small operators in these regions. A lead processing plant will be erected at San Juan and, under an agreement with the National University of Cuyo, the University will provide technical assistance. Similar arrangements will be made for treating the copper deposits in Mendoza and the manufacture of aluminum at Calingasta, San Juan.

MEXICO—*Praiser and Martinez* are operating a group of mines at San Francisco in the Zimapan district. A 100-ton flotation plant is in operation. They have recently completed a truck road connecting the plant with Zimapan, a distance of 25 kilometers, and connecting also with the Mexico-Laredo highway, a distance of 21 miles. Road construction cost $525,000; the *Junta de Caminos Vecinales* of the state of Hildago will contribute one-third of this amount.

BRAZIL—The Instituto de Pesquisas Tecnologicas, University of Sao Paulo, has been treating about 500 metric tons of lead annually. The metal obtained by the Instituto, with 99.997 percent lead, can be considered of the highest quality. The production of silver, a byproduct of the lead metallurgy, totaled 1,200 kilograms in 1954.

E. A. GODOY & CO., INC.
CUNARD BUILDING, 25 BROADWAY
NEW YORK 4, N. Y.
Cables: LIOGO, NEW YORK

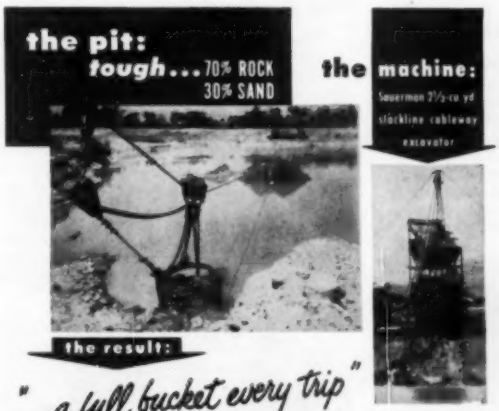
GENERAL AGENTS
FOR
MINING COMPANIES

The CONCENCO® Revolving Feed Distributor Splits Feed Accurately and at Low Cost

For increasing the efficiency of a circuit or battery of mineral concentrating tables or other equipment, the CONCENCO Revolving Distributor splits feed into equal or unequal parts . . . exactly to your needs. It is a heavily fabricated machine that requires but 1 H.P. or less in operation. Both original and maintenance costs are exceptionally low. Send for full information.

Made by
"The Original Deister Company"
Incorporated 1906"

The DEISTER CONCENTRATOR CO. 925 Glasgow Ave., Fort Wayne, Indiana



SAUERMAN FIELD REPORT:—

Helena Sand & Gravel Co. switched to this Sauerman equipment in 1946. It's been in operation since then . . . successfully performing difficult underwater excavation of rock and colloidal sand where other equipment had failed.

Sauerman Slackline Cableways span water, bogs or pits . . . reach far, dig deep, lift and carry loads to hoppers or cone piles. However tough the pit, Sauerman equipment brings in a good load every trip.

With a Sauerman Slackline Cableway, one man—in safe position—operates a single machine. Cableways range from 1/3 to 3 1/2-cu. yds.—span up to 1,000 feet . . . handle sand, gravel, clay, peat, ore and rock.

HERE'S MORE INFORMATION FOR YOU:

FR-216	Easy Excavating in a Tough Pit	FR-102	Digging Gravel From a River
FR-213	Cleaning Ponds Without Draining	Catalog C	Sauerman Slackline Cableways

SAUERMAN BROS. INC.
638 S. 28th Ave. | BELLWOOD, ILLINOIS

PRODUCTION EQUIPMENT PREVIEW

PEP is just what new equipment, increased mechanization, and new methods can give to your mine, mill or smelter. This PEP section is MINING WORLD's way of making available to you some of the finest current information on mechanization.

Lightweight Gamma Gun Is Completely Transistorized

The Gamma Gun (UAC No. 511), made by Universal Atomics Corp., is a lightweight, highly sensitive, yet extremely durable Scintillation Counter designed for use on the ground or in the air. It has six operating ranges to give maximum sensitivity, and four time constants ranging from 1 to 60 seconds.

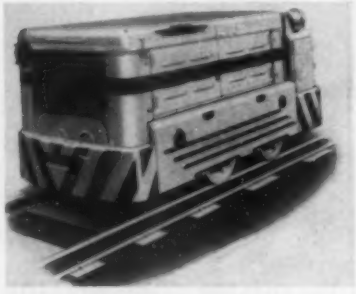
The use of transistors in combination with mercury cells completely eliminates drift according to the manufacturer. Powered by Universal's "Miracle Transistorized Power Supply," the Gamma Gun gives over 500 hours of continuous field use without battery changes.

A 2¾ by 1-inch sodium iodide crystal has been provided so that significant changes in ground radioactivity can be detected at altitudes up to 1,000 feet with good statistical accuracy. The UAC No. 511 is completely self-contained and requires no external power supply or installation of any kind—yet it weighs only 5 pounds. Circle No. 69 for complete information.

Self-Feeding, Materials Handling Valves Announce

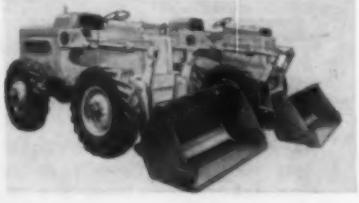
The Allen-Sherman-Hoff Co., Wynnewood, Pa. announces the availability of its new line of Type C materials handling valves, designed for efficient flow control in the pneumatic transport of fine solid materials.

These valves offer advantages of self-feeding, non-plugging operation with positive shut-off, maximum carrying capacity, minimum frictional wear, and ease of maintenance in the handling of such materials as boiler fly ash and other industrial dusts. Intended for installation in vacuum transport piping systems, A-S-H Type C valves are available with either air-electric, remote or manual controls. For further information circle No. 80.



New Mine-O-Motive Ready for Operation

The Plymouth Locomotive Works, a Division of the Fate-Root-Heath Company, Plymouth, Ohio, announces a new line of Diesel locomotives to be called the Plymouth Mine-O-Motive. The Mine-O-Motive is offered in sizes from 5 to 10 tons and will eventually include a 2 ton trammer. This series includes a "Permissable" model fully tested and approved by the U.S. Bureau of Mines. Suitable scrubbers and exhaust conditioners are offered on all models of the Mine-O-Motive along with Diesel-Torque converter drive. For more information circle No. 79.



Two New Four-Wheel-Drive Payloaders on Market Now

The Frank G. Hough Co. has just announced the introduction of two entirely different four-wheel-drive models to their line of Payloader tractor-shovels. These new machines have a one cubic yard, and a one and one-half yard heaped capacity. Both machines are available with either gasoline or Diesel engines. Many outstanding new features have been included in the new design of these two models. Circle No. 52 for more details.

Conveyor Belt Repairs Quickly and Easily Made

Conveyor belt repairs can be made on the job and in a few minutes with the "Clip-A-Rip" belt repair and patch clips manufactured by the Three Point Belt Lacing Co. The teeth of the clips are constructed to pull the damaged areas securely together and have staggered points to prevent single-line strain. "Clip-A-Rips" are available in three sizes to repair or splice belts from ¾-inch to ¾-inch thick. Descriptive literature and prices are available—Just circle No. 70.

New Logmaster Portable Electric Logging Unit

The George E. Failing Co. has announced the development of the new Failing Logmaster. This instrument may be used in numerous types of present standard bore hole surveys, and may readily be altered to accommodate new surveys in the future. The Logmaster has been field tested under the most rigorous conditions, and results have shown that the instrument is very versatile and accurate, and that resulting maintenance costs were extremely low. Find out the details, circle No. 59.

SPEED AND PRECISION FOR WEIGHING: Automatic Schaffer Poidmeters combine high speed with extreme precision. Weighing, blending, feeding, mixing, recording, and proportioning can all be accomplished with one machine. They are also available with total weight recorders and remote controls for showing and changing feed rate. A descriptive Catalog is available from the Schaffer Poidmeter Co. Circle No. 1.

DISCOURSE ON ROCK DRILLING: There is still a lot to be learned about rock-drilling methods, but with any method the important feature is the final costs. Find out more about costs and drilling methods with the use of Consolidated Pneumatic combination of Seco carbide tipped drill rods and the CP-32 and CP-59 rock-drill, by circling No. 2.

FEED CONTROLLED BY WEIGHT: The "Feedoweight," made by Merrick Scale Mfg. Co., is a self-contained conveyor feeder scale that feeds, weighs and totalizes. If you want better control of ball mill feed, you will want further information about the "Feedoweight." Circle No. 4.

FRFE BOOKLETS provided by the Caterpillar Tractor Co. are now available. These booklets tell about new attachments for Cat equipment, testing of clutch and brake linings, oil filter research, testing of track parts, drive seals, engine temperatures, and parts service. Booklets are also available in French, Spanish, & Portuguese. Circle No. 5 for your booklets.

WALL CHART: A wall chart on the proper selection and maintenance of conveyor belting is offered to conveyor users by Hewitt-Robins, Inc. The chart, measuring 23- by 33-inches, contains 12 practical maintenance tips for getting more life out of belts. Circle No. 6 for your copy.

MAGNETIC PULLEY BULLETIN: Stearns Magnetic, Inc. has recently issued a new Electro-magnetic Pulley and Pulley Separator Bulletin No. 303-C, incorporating a new simplified pulley selection method. The bulletin includes detailed specifications on the company's Magnetic Pulleys and Pulley Separators. Circle No. 7 to receive your copy.

NEW MOTOR SCRAPER: Engineering, design, construction and mechanical features of the new Allis-Chalmers TS-360 Motor Scraper are outlined in the new two-color catalog now available from the A-C Company. Photographs and drawings assist the reader to understand better the many advances incorporated in this 20 cubic yard heaped, or 15 cubic yard struck capacity motor scraper powered by the 280 Allis-Chalmers Diesel engine. Circle No. 14 for your copy.

CONVEYOR BELT SERVICE: The conveyor Belt Service, Inc. of Virginia, Minnesota specializes in repairing large conveyor belts. Damaged belts are dried, repaired, and revulcanized at their modern Minnesota plant. For further information circle No. 15.

VARIABLE SPEED CONTROL: Sterling Electric Motors, Inc., announces a new bulletin on their Speed-Trol Variable Speed Transmissions. The informative brochure has sections of interest to both engineers and layman in its discussion of inner workings of the Sterling positive pulley design. For your copy circle No. 16.

"CUMMINS WHO'S WHO!" This is the title of Cummins new booklet which is a complete directory of all manufacturers who use Cummins Diesel engines in their equipment. All types of equipment are listed. Send for your copy today. Circle No. 17.

GALION CATALOG: Publication of a new 6 page catalog, describing Galion Allsteel's complete line of Transporter, Excavator and Hitchhiker trailer dumps, is announced by Galion Allsteel Body Co. This catalog furnishes full specifications for 7 different Galion models. Send for your copy. Circle No. 18.

WIRE ROPE BOOKLET: A new 28-page booklet has just been issued by the E. H. Edwards Co. describing the various steps involved in the manufacture of wire rope. This booklet is fully illustrated and goes into detailed descriptions of all phases of wire rope manufacture. For a copy circle No. 19.

NEW DIAMOND BIT CATALOGUE covering the complete line of Hoffman "Oriented Diamond" Drill Bits is now available. Especially designed for quick, easy location of important drill bit data, Hoffman's new catalogue lists sizes, setting charges, weights, uses, etc. for all standard bits. Circle No. 20 for your copy.

DRILL CATALOG: A new drill catalog published by the Acker Drill Co. of Scranton, Pa. is now available. An up-to-date listing of all drilling tools used for soil sampling and prospecting is contained. Circle No. 21 for your copy.

MOTOR INSULATING SYSTEM: The "Silco-Flex" all-silicone-rubber insulating system for motor and generator windings is discussed in a new four-page leaflet released by Allis-Chalmers Manufacturing Company. Circle No. 22 for your copy.

"THREE TOOLS IN ONE" is the title of a new booklet recently published by the Kwik-Mix Co. The bulletin describes the new light-weight Moto-Bug. With an interchangeable combination of hopper, platform and forklift the Moto-Bug can load, lift, and haul all types of material weighing up to one ton. Circle No. 23 for your copy.

BLOWOUT-PROOF TIRE for trucks and busses that will outlast the vehicle is now a reality, according to the U. S. Steel's American Steel and Wire Division. Cord wire is built into the plies, two to four of which are formed in the tire carcass. For more information circle No. 24.

PROTECT YOUR PIPELINES with various types of "Scotch" brand tape. "Scotch" brand has a protective tape for your particular corrosion problem. Minnesota Mining and Manufacturing Co. has recently released a 16-page illustrated booklet regarding the various types and properties of "Scotch" brand tapes. For your copy circle No. 25.

MINEPHONE: New FM communication system for underground and surface mining operations, is featured in a new bulletin recently published by the Mine Safety Appliances Co. The minephone can easily be installed and operated, from both stationary and mobile positions. For your bulletin circle No. 26.

HELIARC WELDING bulletin describes new welding processes. A new 8-page bulletin describing various welding processes has recently been released by the Linde Air Products Co. Circle No. 27 for your bulletin.

DRIVE SELECTION BOOKLET: A 74-page booklet carrying handy multi-color tables for quick and easy selection of constant speed "Texrope" V-belt drives has been released by the Allis-Chalmers Manufacturing Company. Circle No. 28 for your copy.

CATERPILLAR TRACTOR CO., has published a two-color brochure describing the new No. 933 and No. 955 Traxcavators. The publication contains model views of the units in action, plus cutouts of their new features. Circle No. 29 for your bulletin.

CONVERTIBLE SHOVEL: The new Bucyrus-Erie 71-B 3-yard shovel is de-

Circle numbers and mail this card for free product literature

to get further information on any item described in the Production Equipment Preview, note the key number of that item, circle the corresponding number on the PEP card at the right, and mail. If mailed from a point outside the United States, proper postage must be used.

PLEASE PRINT

This card may also be used to subscribe by filling in here

See other side for subscription rates

NOVEMBER 1955 **NOT GOOD IF MAILED AFTER JANUARY 25**

FILL IN NUMBERS OF ITEMS YOU DESIRE

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

Also send further free information on the equipment advertised on pages:

..... Product ..... Manufacturer .....

..... Product ..... Manufacturer .....

Name ..... Title .....

Company .....

Address .....

Use this section to subscribe only

☐ New Subscription ☐ Renewal ☐ 1 yr. $3 ☐ 2 yr. $5

Name ..... Title .....

Company .....

Address .....

scribed in a new 16-page bulletin. The model 71-B is readily convertible to dragline, clamshell or lifting crane. Send for your bulletin. Circle No. 30.

SPECTROPHOTOMETRY: Two new reports telling how spectrophotometry is solving metals analyses problems are now available from Beckman Instruments, Inc. Circle No. 31 for your copy.

INTERESTING MAGAZINE: The "Production Road" released by the Twin Disc Clutch Co., Racine, Wisc., tells in story form the history of earth-moving progress, and how Allis-Chalmers, Caterpillar, and International have brought modern efficiency of torque converter drive to speed work. Timely tips to all powered equipment users are included in the publication. Send for yours. Circle No. 32.

NEW KILN GUN SHELL with 18 per cent more muzzle energy is now being offered by the Arms and Ammunition Division of Olin Mathieson Chemical Corp. at no change in price. Reduce your kiln-cleaning costs with this new type shell. Find out more by circling No. 33.

INVESTIGATE the possibilities of aerial exploration. Send for the new, fully illustrated brochure released by IREX. This interesting booklet gives a complete outline of the numerous engineering and exploration services made available to you by the International Resources Engineering Group. The brochure is yours when you circle No. 34.

NEW METALS DETECTOR: The Gardiner Electronics Company of Phoenix, Arizona, has begun production on a new Metal Detector which has been designed to work over salt water. In addition, it distinguishes metals from black magnetic sand, has negligible ground pickup. Circle No. 35.

DENVER CATALOG: Denver Equipment Company has published a 76-page catalog, LG3-B10, "Denver Laboratory Equipment" describing over 146 different items to help you establish your own laboratory testing needs. Circle No. 36 for your copy.

NEW REAGENT: Mona Industries, Inc. of Paterson, N. J. and Greenville, S. C. announce the availability of a new, additional group of fatty acid amide condensates, called Monamid 150 Series. Compared with conventional reagents these new products contain up to 50% more amide than products previously called 100% active. Use for Detergency, wetting foaming, thickening. For more information circle No. 37.

DIAPHRAGM PUMPS: Adjustable stroke diaphragm pumps is the subject of Denver Equipment Co.'s new bulletin P8-B9. This bulletin explains operation, construction, mechanism, and capacity of the pumps. Recommended service for pumps: Thickener underflow, metering feed to process units and as filtrate pumps. For your copy circle No. 38.

OPEN GEAR LUBRICANT: Molykote Lubricants has available a new catalog describing two new types of gear lubricants. Featured in the lubricant is a diluent, the evaporation of which leaves a plastic film which does not tend to hold dust, and resists being washed off by water. Circle No. 39.

NEW OIL SEALS: "Clipper Oil Seal" is an illustrated, 28 page manual just published by Johns-Manville. The information is arranged for quick reference and covers the selection, application, and installation of Clipper Seals. For your copy circle No. 40.

MINE VENTILATION TUBING: Spiratube-M, manufactured by Flexible Tubing Corp., requires lower fan loads because it is non-collapsible at ordinary fan pressures. No pressure is wasted in maintaining its tubular shape as the high-carbon, spring steel helical coils hold the tube at maximum diameter and length. It will snake through the most tortuous passage or take sharp bends up to 180 degrees without buckling. Sections of Spiratube-M link together or detach without tools or exra pars in 10 seconds. Circle No. 41 for a copy of Catalog C2-2.

NEW VARIABLE SPEED CHANGER: Allis-Chalmers releases new "Vari-Pitch" speed changer bulletin. This speed changer is available in 12 sizes from 1 to 75 hp, with output speeds to 2900 rpm. A turn of the handwheel changes speed. For your bulletin circle No. 42.

MAPPING FOR TOMORROW'S WORLD is the title of an interesting brochure by Aero Service Corporation. It explains how the aerial topographic map, based on air photos and a network of key measurements on the ground, can help you plan your mine development or calculate ore stockpile inventories. You will also want to read the section about airborne magnetometer surveys used to locate ore deposits. For your copy of this informative brochure, circle No. 43.

MOISTURE-RESISTANT ELECTRIC MOTORS: Induction and synchronous motors, made by Westinghouse, have a remarkable moisture-resistance due to Thermalastic—a superior new insulation developed by Westinghouse research engineers. In a recent test, an open-type motor was soaked with water—inside and out—and successfully withstood 1.7 times normal line-to-line voltage applied across windings and core, or 3 times normal line-to-ground voltage. If moisture is a problem in your operation, you will want more information about these motors. Circle No. 44.

LOW COST URANIUM DETECTOR: The "Geigerscope" indicates radio-active content with sparkles of light. According to the manufacturer, Ken Research, it is more sensitive for use on samples than a Geiger counter. Portable as a pocket watch, it requires no power source . Complete cost, including uranium ore sample, is $5. You will want a "Geigerscope" to carry with you at all times. Circle No. 45 for further information.

CONVEYOR BELTS STAY JOINED: "Clip-A-Rip" belt repair and patch clips will enable you to repair and splice conveyor belts on the job and save you costly down-time. Made by Three Point Belt Lacing Co., the new type clips feature staggered points to prevent single-line strain. For further information and prices, circle No. 46.

STANDARDAIRE BLOWER: A new four-page, two-color folder is now available from the Read Standard Corp. This booklet gives engineering details and technical specifications of a compactly designed blower for handling air or any other gas under either pressure or vacuum. Circle No. 47.

PROSPECT AT NIGHT: Prospecting need not be limited by the daylight hours with the introduction of Nuclear Instrument Inc.'s new remote meter. This illuminated meter is fastened to the dashboard of your vehicle by suction cups for easy visibility when traveling. It is to be used with the Radiometer model 802. For more information circle No. 48.

SIEVE SHAKER: The A. W. Fahrenwald Co. has announced the release of its new Vibe-Rotator Sieve Shaker. Lab screen analyses can be made easier and faster with this mechanism. This Shaker vibrates while it rotates, is mechanically simple and rugged. Circle No. 49 for further information.

For Free Product Literature see other side

Postage Will Be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD

FIRST CLASS PERMIT No. 3430, Sec. 34.9, P. L. & R. San Francisco, Calif.

MINING WORLD—WORLD MINING

121 SECOND STREET

SAN FRANCISCO 5,

CALIFORNIA

U. S. A.

SUBSCRIPTION RATES:

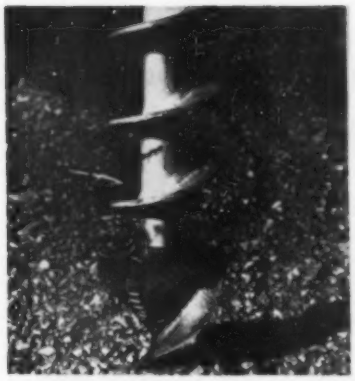
(including the annual Review and Directory)

NORTH, CENTRAL AND SOUTH AMERICA:	one year $3 two years $5
OTHER COUNTRIES:	one year $4 two years $7

SUBSCRIPTIONS IN STERLING one year 1/9/1 two years 3/10/0 three years 5/12/6	Harold P. de Looze MINING WORLD c/o Harold P. de Looze Ltd. 8, Peter Street Manchester 2, England
CANADIAN CURRENCY: one year $3 two years $5	MINING WORLD Royal Bank Bldg., Vancouver, British Columbia, Canada

FOREIGN READERS NOTE:

The copy of World Mining you are receiving consists of carefully selected material from the complete American edition of Mining World to which the above subscription rates apply. If you would like to receive the complete Mining World, fill in the lower section of the reverse side of the card at the left. The card must carry proper postage if mailed from a point outside of the United States. You may send payment or be billed later.



New Pengo Auger Drill Head Announced

The Petersen Engineering Co., Santa Clara, Calif., introduce the Pengo fish tail screw bit, a new addition to their line of earth boring tools. This new bit is designed for use with any make of continuous helix type auger for vertical or horizontal drilling of shot holes, wells, and other purposes utilizing small diameter holes. Sizes range from 2¾-inches to 10-inches in diameter, for depths to approximately 300 feet. The bit drills rapidly through sandstone, limestone, shale, and other material except hard rock. Circle No. 75 for more information.

Long Life Shaft Guides Through Use of BAGAK

BAGAK, trade name for Apitong, a Philippine hardwood is made available in the United States by the Mahogany Importing Company.

BAGAK is a wood peculiarly free from defects, such as knots, cat faces, etc. This wood contains a very small amount of oil which serves commendably as a self lubricant to minimize surface friction. The above mentioned qualities, along with its ability to stay unusually flat and resist warping, makes this wood ideal for shaft guides. Many mines are presently using this long-life hardwood in their shafts.

A brochure describing this wood is now available. This booklet also describes various tests made on this wood for stress, strain, hardness, and wear resistance. Circle No. 76 for your copy.

New International TD-24 Has 161 Drawbar H.P.

Extensive tests by the University of Nebraska's Agricultural Engineering Department have shown the TD-24 to produce 161 drawbar horsepower. Other items checked were fuel and lubricating oil consumption, belt power at various loads, engine speeds, temperature and slippage.

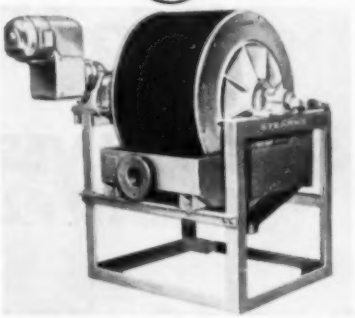
In addition to that 161 drawbar horsepower, the TD-24 has eight forward and eight reverse speeds, ranging from 1.6 to 8.0 miles per hour; syncromesh four-speed transmission with an instant high-low range within each gear speed; Planet Power Steering, to give the operator finger tip control. For further information circle No. 63.

Diamond Drilling Concern Expands Plateau Facilities

To help meet the rapidly increasing demand for diamond drill equipment and products throughout the Colorado Plateau, increased stocks are now being carried at Sprague & Henwood's Western headquarters on Fruita Road, near Grand Junction, Colo. Jack Richards well known on the Plateau, has been advanced to become western field representative. Known primarily as world-wide contract drillers, Sprague & Henwood, Inc., of Scranton, Pa., are also manufacturers of high-speed core-drilling machines, oriented diamond bits and a complete line of accessory equipment for core drilling and soil sampling; large stocks of all commonly used items being maintained for quick delivery.

The Fruita Road headquarters, and general supervision of all Sprague & Henwood activities throughout the Colorado Plateau, will continue under the management of Robert R. Carver.

IT'S NEW (No.) CIRCLE IT



New Separator Recovers Media in HMS Processes

As you may have noted last month, the above picture of Stearns' Magnetic Drum Separator appeared upside down. We are rerunning the picture and also the description of the Separator.

The Stearns "WPD" Model "M" Permanent Magnetic Drum Separator has been designed to provide efficient magnetic recovery of magnetic media as used in heavy density separation plants. Made by Stearns Magnetic, Inc., the separator incorporates a fixed magnet assembly mounted inside an outer rotating cylinder. The cylinder acts as a carrier for the magnetic solids attracted to the magnet assembly. The separator is so designed as to produce a thickened magnetic concentrate product sufficiently high in specific gravity to be re-introduced into the heavy media vessel. For more information circle No. 66.

Notes From The Manufacturers

Commercial development of the process for manufacturing man-made diamonds recently announced by the General Electric Research Laboratory has been assigned to the Carboloy Department, Detroit, Michigan. *K. R. Beardslee* is general manager of the unit.

J. F. Catalane, Harnischfeger Corporation, has been appointed general sales manager of the P&H Construction and Mining Division. He will continue to act as sales manager of the power crane and shovel division.

New application engineers in Allis-Chalmers Manufacturing Company's processing machinery department are *Wayne C. Dannenbrink*, *Frank J. Dever*, and *Julian B. Lewis*. Their headquarters are in Milwaukee, Wisconsin.

Gwilym A. Price, president of the Westinghouse Electric Corporation, was elected chairman and president at a recent meeting of the board in New York City. *Mark W. Cresap, Jr.*, vice president and assistant to the president, was named executive vice president and deputy chief executive officer.

Hubert B. Smith, Colorado Fuel and Iron Corporation, has been named director of product engineering at the firm's Claymont, Delaware plant. He was formerly vice president in charge of research with the Great Lakes Steel Corporation.

C. S. Wiedman, product and process development engineer for General Electric Company's carboloy department, has been promoted to manager of carbide products development engineering. He has been with GE since 1947.

Dorr-Oliver, Inc. has acquired the marketing rights to the Merrill-Crowe Cyanide Precipitation Process and the Mills-Crowe Cyanide Regeneration Process. Dorr-Oliver rights to these gold and silver recovery processes are worldwide, with the exception of certain African territories. The firm also has the right to market all equipment and apparatus of The Merrill Company, San Francisco, California, used in conjunction with the processes.

Hewitt-Robins, Inc. has announced the following personnel changes: *Martin VanderLaan*, assistant to the manager of operations, promoted to assistant manager of operations; *Wesley H. Raff*, contract engineer, named consulting engineer; *Douglas H. Martini*, chief project engineer, to manager of engineering sales; and *Jack Van Kleunen*, project engineer, to chief project engineer.

Hamilton F. Biggar, Jr., Reliance Electric & Engineering Company, Cleveland, Ohio, has been named manager of new product development. He also heads the Atomic Power Motor Development program.

M. T. Sprague succeeds *Roy A. Legge* as Oakland, California district manager of the motor truck division, International Harvester Company.

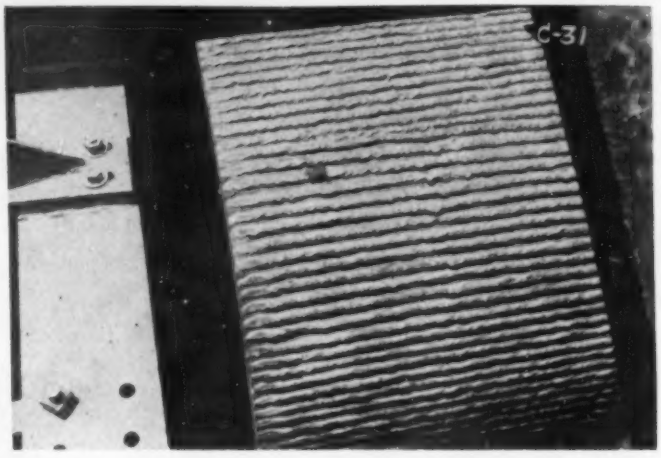
Appointment of a Cummins Engine Company, Inc. distributor for the Territory of Alaska has been announced. President of the new Cummins Diesel Sales of Alaska, Inc., with headquarters in Anchorage, is *R. B. Newell*, formerly with the firm in Seattle, Washington.

Send payment or be billed later.

RESISTO-LOY Reduces Excessive Maintenance Costs

on

CRUSHER ROLLS



In the use of RESISTO-LOY on manganese crusher rolls, the old rule applies—It's not the first cost, but the upkeep that counts". If you are crushing large tonnages of hard materials daily, and if you are forced to maintain the rolls constantly, we can put a stop to the excessive costs of such maintenance. In the American way, the good old competitive way, we can be sure of one thing—"we get just what we pay for".

Regardless of price, we invite you to prove that statement to your own complete satisfaction. Good things DO cost more, and if you want the satisfaction obtainable from a composition of the finest metals available, then you can get this satisfaction from RESISTO-LOY.

The above illustration shows the correct application of RESISTO-LOY to produce ¾" minus materials. This is a job your plant welder can efficiently handle. Call in our Field Man. Let him show you how to cut maintenance costs on your rolls. He is a Specialist. You can count on his advice and recommendations.

THE RESISTO-LOY CO., INC. — Grand Rapids 7, Michigan

An Unfailing Market for:

GOLD • SILVER • COPPER LEAD • ZINC

Ores • Concentrates • Bullion Precipitates • Furnace Products

FOR SCHEDULES, FREIGHT RATES, ETC., WRITE TO YOUR NEAREST OFFICE

AMERICAN SMELTING AND REFINING CO.

ASARCO

405 Montgomery Street
San Francisco 4, Calif.

700 Crandall Bldg.
8-10 West 1st South St.
Salt Lake City 1, Utah

P. O. Box 1111
El Paso, Texas

P. O. Box 1605
Tacoma 1, Wash.

607 First National Bank Bldg.
Denver 2, Colorado

East Helena, Montana

810 Valley Bank Building
Tucson, Arizona

Plant Will Reclaim Mica From Tennessee Silt

International Minerals and Chemical Corporation has started construction of a mica plant at Greeneville, Tennessee which will reclaim mica from silt that has accumulated behind the Davy Crockett Dam in Nolichucky Reservoir near Greeneville. International Minerals was high bidder on a lease from the TVA for reclamation of the mica reserve.

Expected to be in production by the spring of 1956, the plant will cost about $400,000. Initial capacity will be approximately 100 tons a day. The plant will be operated by the Industrial Minerals Division of the firm, and the product is expected to be used in roofing, paint, and rubber.

Pilot Plant To Treat Low-Grade Manganese

A pilot plant designed for full run tests and study of a new process for production of manganese from low-grade ores will be built at Joplin, Missouri, as a result of a contract between Ores Beneficiation, Inc., and the General Services Administration. The government has agreed to underwrite tests to a maximum cost of $202,100 and test runs are planned within 15 months.

Ores Beneficiation is to design a pilot plant to handle 300 pounds an hour of low-grade ores originating in Maine, Minnesota, New Mexico, Arizona, Arkansas, and Mexico. Bruce Williams Laboratories of Joplin developed the new process. If the pilot test runs are successful, a 500-ton per-day plant will be built.

All the technical test information will be furnished to the government.

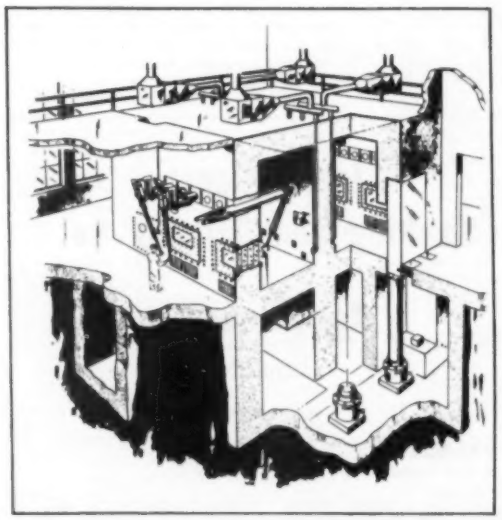
The fourth uranium strike has been announced in western Oklahoma. The latest is near Foss, Custer County, 50 miles west of Clinton, and was located by Oscar Gunter of Hammond and his son Edward Gunter of Elk City. Together with four associates, they have formed *Red Rock Uranium Company*. Other members are: Rex B. Hoober, H. T. Johnson, H. A. Irwin, and W. C. Lister. Other strikes are in the same general area—two near Cheyenne in Rogers County, and the other south of Clinton in Washita County.

Dekarin Mining Inc. has been formed at Marshfield, Wisconsin to "mine, process, and sell any and all minerals." Incorporators are Reinhold K. Karau, Lloyd Ringquist, and William J. Dehn. The latter is also registered agent for the corporation.

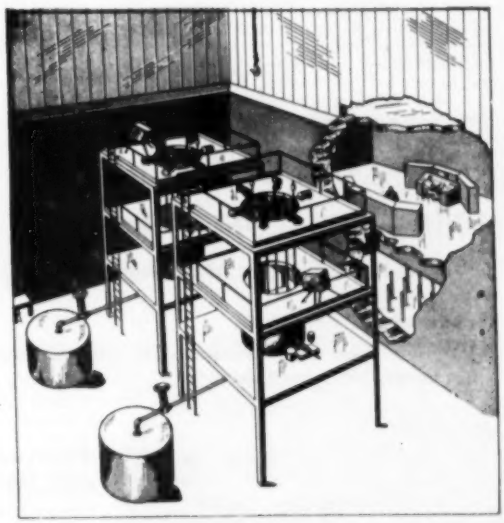
Mobile Drilling Company of Indianapolis, Minnesota is conducting core drilling operations for *Northgate Uranium Company* on claims located on the Smith Ranch 40 miles southwest of Dickinson, Billings County, North Dakota.

A group organized as the *Littlefork Men's Club* has undertaken exploratory drilling operations on six 40-acre sites 11 miles south of Littlefork, Minnesota. Actual drilling is being done by the *North American Uranium Mining Company* of Virginia, Minnesota on a profit-sharing basis. The company first staked the claims under the state's old wildcat law and later converted them into uranium leases. Members of the group are Donald Bradburn, Ole Lee, Juliu Lockin, Herman Staples, Miles Ladsten, and Clarence Olson. Eiler Popejoy owns a share in one of the claims.

Battelle Institute Studies Uranium Use in New Research Center



Two units of Battelle Memorial Institute's new atomic energy research center near Columbus, Ohio have been installed, and the third unit will begin operating early next year. The hot cell laboratory (shown above) was completed in September and will be used for studies of radiation effects on materials, nuclear fuel reprocessing, radioactive waste disposal, and the processing of radioisotopes. The laboratory houses two cells, one to permit safe handling of up to 10,000,000 curies of radioactive material that emits gamma rays having an energy of 1,000,000 electron volts, and the other designed for gamma radioactivity levels up to 10,000 curies. The sketch above shows relationship of the two cells to their respective subterranean chambers. The lower chambers are used for storage and for experiments with radioactive materials which do not need direct viewing. Both upper cells have a 12-foot head clearance, and longer chemical columns can be extended through holes into the subterranean chambers. Hydraulic rams at the right end of the cells raise and lower the two steel doors weighing 13 and 20 tons each. Above the cells is a ventilation and air purification system. Manipulations within the cells are done with a variety of remote-handling equipment, and refined operations are accomplished by master-slave mechanical hands that operate through the concrete walls.



Battelle's power reactor development laboratory is now being completed and has been designed for development of commercial power-generating plants. The sketch above shows the 40- by 40- by 50-foot room in which nuclear reactor cores may be mocked up for experimental study of variables affecting reactor performance. The cutaway shows the control room and below it a storage vault for fissionable material. Instrumentation and control mechanisms can also be evaluated in this laboratory. Third unit at the research center will be a swimming-pool-type research reactor. Assemblies are being constructed by the American Machine and Foundry Company of New York. The reactor will start the nuclear fission reaction next spring. It is designed to operate at 1,000 kilowatts on U-235 fuel. H. W. Russell, technical director and the Institute's senior physicist, has overall responsibility for the technical aspects of the nuclear energy research. H. R. Nelson, manager of Battelle's department of physics, has supervision of the new research center. G. D. Calkins is in charge of technical work at the hot-cell laboratory, and Sherwood L. Fawcett and Joel W. Chastain, Jr. are supervising the research reactor and development laboratories. The center provides $3,500,000 worth of facilities for industry and government research, and the hot-cell laboratory is the first of its capacity to be built without Federal funds.

Great Western Uranium Corporation has been organized and incorporated at Bismarck, North Dakota to search for and deal in uranium and other minerals. Capitalized at $250,000, its directors include A. J. Breitbach, Glenn R. Addington, William T. Bristol, and William J. Steckman, all of Bismarck.

The four-month strike of the *International Chemical Workers Union* against the *International Minerals & Chemical Corporation* Florida phosphate operation was finally settled. During the strike period, the company's operations were manned by supervisory staff members who were able to maintain limited production despite dynamiting of the phosphate chemical plant near Bartow and some violence and intimidation.

General Electric Company will establish a $5,000,000 rectifier department headquarters on a 122-acre tract about two miles southeast of Lynchburg, Virginia. The plant is expected to go into operation in January 1957.

W. R. Grace & Company has announced that its *Davison Chemical Company Division* and *Rare Earths, Inc.* of Pompton Plains, New Jersey, a wholly owned subsidiary, have joined in a program to expand production, sales, research, and development of rare earths and thorium. Rare Earths, Inc. has a plant in operation at Pompton Plains for processing rare earths and thorium from monazite sands, and additional facilities are being installed at Davison's Curtis Bay Works at Baltimore. To coordinate Grace's activities in the field of industrial atomic energy, Davison has formed an Atomic Developments Department with headquarters at Baltimore. Marlin G. Geiger, Davison president, has named Dr. Allen T. Cole, as manager. Dr. Cole was formerly manager of the company's Florida Phosphate Division at Bartow. One of the objectives of the new department will be to expand industrial uses of rare earths through research, a continuation of work done in this field by Rare Earths, Inc. under Richard Mandle, vice president.

Rem-Cru Titanium Inc., owned jointly by *Crucible Steel Company of America* and *Remington Arms Company*, has purchased a group of five buildings and 10 acres of land in Midland, Pennsylvania from Crucible. New equipment designed for processing titanium will be installed.

Oliver Iron Mining Division of *U. S. Steel Corporation* placed its new HMS plant at *Gross-Marble* mine in operation of a limited operating basis late in September. This is the first HMS plant of Oliver on the Mesabi Range. It will process "retreat" ore from the Marble open pit. Operations were limited before "freeze-up" but initial operations this year enabled the firm to smooth out the flowsheet for the 1956 season.

Construction of the new *Republic* mine flotation plant by *Cleveland-Cliffs Iron Company* is nearing completion. It is expected that the mill will be ready to receive ore by January. The Republic mill is similar to the Humboldt mill of Cleveland-Cliffs which has been in operation for nearly two years. However, a pelletizing addition is included in the Republic plant which was not in the Humboldt.

The *W. S. Moore Company* has awarded a contract to the *Associated Builders* of Virginia, Minnesota to move the concentrator at the *Prindle* iron mine to the *Mariska* mine at Gilbert. The Moore firm has completed operations at the Prindle, after shipping 1,410,686 gross tons in seven years. The Mariska is an open-pit mine. In addition to the Prindle concentrator, the crushing plant at the *Yawkey* property will also be moved to the Mariska as part of the new plant facilities.

Cleveland-Cliffs Iron Company has awarded a contract to the *Western Knapp Engineering Company* for the design and construction of a cyclone plant addition to the *Holman Cliffs* mine's washing and heavy media plant. The new addition will be a two-unit arrangement to handle a total of approximately 180 long tons per hour of minus-¾-inch, plus-48-mesh iron ore.

BUNKER HILL & SULLIVAN MINING AND CONCENTRATING CO.

Mines and Smelter at Kellogg, Idaho

Buyers of:

Lead ores and concentrates, zinc concentrates, silicious gold ores.

Sellers of:

"BUNKER HILL" brand of refined Pig Lead, Slab Zinc, Cadmium crude Antimonial Lead and Leaded Zinc Oxide.

We are proud of our "BUNKER HILL" trade mark. It represents the highest quality of metals produced. We likewise strive to make "BUNKER HILL" known as a symbol of the highest quality in our relations with our employees, with our suppliers of ores and concentrates, with our stockholders and with the general public.

For information regarding ore rates and shipments Address:

BUNKER HILL SMELTER
Box 29
Kellogg, Idaho

International Smelting and Refining Co.

ANACONDA
from mine to consumer

Buyers of

Copper, Silver & Gold Ores and Concentrates:

Copper Smelter—Miami, Arizona

Address: Ore Purchasing Department
International Smelting and Refining Co.
P. O. Box 1265
Miami, Arizona

Lead & Zinc Ores and Concentrates

Lead and Lead-Zinc Smelter
Lead-Zinc Concentrator
} Tooele, Utah

Address: Ore Purchasing Department

International Smelting and Refining Co.

818 Kearns Building
Salt Lake City, Utah

Please establish contact prior to shipment.

Northwest Mining Group Meets December 2 and 3

December 2 and 3 have been set as dates of the Northwest Mining Association's 61st annual convention. All sessions again will be in the Davenport hotel in Spokane, Washington.

For the first time, an entire session will be devoted to the uranium industry. The customary Canadian session will be held and some outstanding speakers from north of the border are being lined up.

Karl W. Jasper, association president, will act as general chairman of the convention for the third consecutive year. Frank N. Marr is assistant general chairman; Robert J. Towne, arrangements chairman; E. K. Barnes and David E. Watson, finance committee co-chairmen; Rowland King, life memberships committee chairman; Mrs. Lowell B. Moon, ladies' program chairman.

Vote Due On Exchange Of Hecla, Bunker Hill Stock

Stockholders of Hecla Mining Company and Bunker Hill & Sullivan Mining and Concentrating Company decided October 26 whether to accept recommendations of the two organizations' boards of directors, which would result in a major stock exchange for the firms. Results were unknown as this story went to press.

Proposals provide for acquisition by Bunker Hill of Hecla's 50 percent interest in Sullivan Mining Company for 275,000 shares of to-be-authorized Bunker Hill common stock and purchase by Bunker Hill of Hecla's 494,696 shares of Pend Oreille Mines and Metals Company stock. This means that Hecla would own 17 percent interest in Bunker Hill common stock. Bunker Hill would become sole owner of Sullivan Mining Company and would own a 36 percent interest in Pend Oreille. Hecla would receive an annual operating fee and a net rental fee (after property taxes, insurance, and other expenses) of $70,000 instead of a net annual rental fee of $56,000 previously received. Bunker Hill would still manage Sullivan's electrolytic zinc plant and sulphuric acid plant in Kellogg, Idaho.

Meanwhile, in a reorganization of Bunker Hill, two new divisions have been formed. Wallace G. Woolf, manager of the Sullivan electrolytic zinc plant, becomes manager of metallurgy, and Harold E. Lee, superintendent of the Bunker Hill smelter, was named manager of plant services division. There are now six major divisions in the company, following recommendations of a management consultant firm which has been working with president John D. Bradley in streamlining Bunker Hill's operations.

DMEA Approves Contracts For Northwest Exploration

The Defense Minerals Exploration Administration has approved exploration contracts calling for expenditure of nearly $600,000 by Northwest mining firms.

The government's share will amount to about $468,000. Largest contract was with Sunset Mines, Inc. of Kellogg, Idaho for $101,125 in a search for new lead-zinc deposits at its Pine Creek district property.

Other contracts:

Silver Star-Queens Mines, Inc., Hailey, Idaho, $100,256, lead-zinc; Bradley Mining Company, San Francisco, $88,000, tungsten, Ima mine, Lemhi County, Idaho; Salmon River Scheelite Corporation, Salmon, Idaho, tungsten, $39,040.

Fred H. and Earl W. Shirts, Hailey, Idaho, Mountain King mine, lead-zinc, $31,304; Bitterroot Uranium, Inc., Bismarck, N. D., Surprise group, Lemhi County, Idaho, uranium, $18,174; Dan C. Peacock and Dan C. Peacock Jr., Orinda, California, Crescent manganese mine, Clalam County, Washington, $31,000.

Twin Sisters Magnesium and Chrome Corporation, Seattle, Skagit County, chromium, $24,175; Mrs. Jennie M. Moore, Glendora, California, Mystery manganese mine, Granite County, Montana, $48,700; George M. Hoffman, Helena, White Pine mine, Jefferson County, Montana, uranium, $26,024; Harold R. Hogan and Ed Pohl, Winston, Montana, Silver Saddle mine, Broadwater County, Montana, lead, $16,460; Bonanza Oil and Mine Corporation, Sutherlin, Oregon, mercury, $58,000.

Rustler Mining Company of Casper, Wyoming has extended the 120-foot incline shaft to 235 feet at the property leased from *Hailey Trust* in Blaine County, Idaho. Diamond drilling has been done on the Hattie vein and it is planned to drift in the footwall crosscutting the vein at short intervals on the 325-foot level. Values are in pitchblendes, silver, and lead.

Rare Metals Corporation of America has optioned uranium discoveries on Trail Creek in Idaho.

San Francisco Chemical Company, prime contractor for the *Stauffer Chemical Company's Carthage* project at North Lake in the Hot Springs Range, Idaho, is preparing to drive a 1,600-foot dip-slope raise from the entry level to the surface. The work will require about 14 months to complete. Drifting at both north and south headings will continue during the process of raising. Since starting development operations in July 1954, progress to date totals about 3,200 feet of tunnel work.

Polaris Mining Company has advanced an exploration heading about 7,500 feet easterly from the 3000 level of its *Silver Summit* mine in the silver belt of the Coeur d'Alene mining district, Shoshone County, Idaho. The face is in ground of *American Silver Mining Company*. The drift will end at about the 10,000-foot mark in property of *Rainbow Mining and Milling Company*. L. J. Randall, Wallace, is Polaris president.

Milling operations were resumed recently by *Idaho Custer Mines* at its *Livingston* lead-zinc-silver mine near Mackay. Leasers are mining about 50 tons of ore daily. Alvo Von Alvenasleben, Seattle, is president.

Bradley Mining Co. is studying the possibility of reopening its antimony mine at Stibnite, Idaho. Antimony imports forced the firm to close the operation of the mine and smelter three years ago. The Office of Defense Mobilization recently asked the company to negotiate contracts with the General Services Administration to provide domestic antimony for the national stockpile. John D. Bradley, president of Bunker Hill & Sullivan, is also executive vice president.

Sunshine Mining Company is obtaining favorable results in deep development of the "08" ore body in the Omega area of the Silver Belt, Coeur d'Alene district, Shoshone County, Idaho. Work is on the new 3,850- and 4,000-foot levels. The Chester vein in the Omega and Rotbart areas, however, has not proved up to expectations on these levels. Ross D. Leisk is vice president and general manager.

Coal-Like Uranium Mineral Found in Washington

This is the site of a new uranium discovery on the Spokane Indian Reservation, Stevens County, Washington, where AEC geologists are checking the unusual find of Big Smoke Uranium, Inc. It is a black, coal-like uranium mineral new to the Northwest and tentatively identified as thucolite, a hydrocarbon of uranium and thorium which sometimes replaces the primary uranium mineral, uraninite. It is similar in appearance to carbonaceous uranium ore being mined at Temple Mountain, Utah. The discovery was made by Eugene Kumbera who had been prospecting on the reservation all summer with his brother, William, and father, Arthur. William is president of Big Smoke; Mrs. Martha Diehm, secretary-treasurer; and Kenneth Russell, company geologist. The recent discovery was almost overlooked. The sand-covered hillside yielded only slight scintillator readings, but because they were moving a bulldozer past the area, they scooped off the top layer of ordinary sand. The underlying black sand gave a radioactive reading double the surface count.

A station and pockets have been cut on the new No. 10 level of the *Little Pittsburgh* mine near Kellogg, Shoshone County, Idaho, and crosscutting to the main vein is under way. It is hoped the work will disclose higher-grade ore which can be mined at a profit at present zinc-lead prices. The mine is leased by *Mascot Mines, Inc.* from *Pine Creek Lead-Zinc Mining Company*. Claude E. Nugent, Kellogg, is secretary of both firms.

A flotation plant of between 500 and 1000 tons daily capacity is being planned for *Highland-Surprise Consolidated Mining Company's* new lead-zinc-silver mine in Stanley Basin, Custer County, Idaho. Some equipment from the firm's 300-ton mill near Kellogg, Shoshone County, may be moved to the southern Idaho property. A wide vein found on the surface has been cut in an exploration tunnel and other known veins lie ahead. *Sunshine Mining Company* has acquired a 50 percent interest. Frank J. Luedke, Spokane, is president of Highland-Surprise.

Calera Mining Company has stepped up production to 700 tons daily at its *Blackbird* cobalt-copper mine, Lemhi County, Idaho. The firm at last report was looking for 50 single men to add to its force of 350. The *Howe Sound Company* subsidiary is the largest cobalt producer in the United States and the largest copper producer in Idaho. E. B. Douglas is manager.

G. P. Williams, George Dana, and B. Anderson of Boise, Idaho have organized *Fontane-Cupel Uranium Corporation* with $200,000 capitalization.

Northwest Uranium Mines, Inc., new Wallace firm, is employing airborne and ground crews in uranium exploration on more than 100,000 acres in northern Idaho and northeastern Washington. Sucthe firm is controlled by *Silver Buckle, Eastern Lead* and *Fortune* mining companies of Wallace; *Pathfinder Uranium Corporation* of Salt Lake City, Utah, and *Stansbury & Associates* of Spokane, Washington. Clark Wilson, vice president, *New Park Mining Company*, Salt Lake City, is vice president and general manager. Dr. F. E. Scott, Wallace, is president.

Uranium prospectors have filed a number of claims in the old *Buffalo Hump* gold mining district, Idaho County, Idaho. First recordings were by R. G. Dryden and Woodrow Fallen, Clarkston, near the old mining camp of Calendar. In the same county, Grangeville men have located several *Copper King* claims in the Elk City mining district. Stanley P. Linder of Bellingham, Washington, located a claim 200 feet north of the Dixie post office.

Minerals Engineering Company is now milling 1,000 tons of tungsten ore daily at its *Ivanhoe* open-pit mine near Glenn, Montana. In August Minerals Engineering milled 27,000 tons of ore at the Glenn flotation plant. Excess mine production is being stockpiled at the mill for treatment during the winter.

Lexington Silver-Lead Mines, Inc., is stockpiling silver-lead ore near Niehart, Montana, preparatory to starting up a new 125-ton flotation plant which replaces one destroyed by fire in 1953. The firm has leased 2,000 acres adjoining the *Mammoth* uranium mine near Clancey, Jefferson County. James A. Allen of Spokane, Washington is president.

Freibergite assaying more than $2400 a ton in gold and silver has been found in a 14-inch vein segment between the 300- and 400-foot levels of the *Marget Ann* mine in the Walkerville area of Butte Hill, Montana. *Mitchell Mining Company*, which has been developing the mine for several years, is preparing to stope three ore veins crosscut on the new 500-foot level. When the new level is in production, it is planned to operate the firm's 100-ton mill on a three-shift basis. E. B. Olmsted of Mount Vernon, Washington is president.

Joe Lopes and John T. McCale have made an initial shipment of manganese ore from the *Lost Lode* claims on David Creek south of Alder, Madison County, Montana. A nine-ton truckload was hauled to *Domestic Manganese Company* in Butte.

Frontier Exploration and Mining Corporation has been organized with capital stock of $400,000 by Theodore Dalke of Kinsey, Montana; Jerry O'Connell, Great Falls; Paul and Anna Fry, Harry W. and Edith M. Spence, and Lee Forr, all of Miles City, to search for uranium and thorium.

Custer Exploration and Mining Corporation has been formed by D. Doxstad, Homer L. Pigg, M. N. Steiner and Sam Kuntz, all Miles City, Montana. Capitalization is $100,000.

The *Thornburg Brothers* of Grand Junction, Colorado, have bought leases on the *White King* and *Lucky Lass* uranium claims 15 miles north of Lakeview, Oregon. According to Garth Thornburg, each group has good commercial ore and each is a "fault" type deposit. The firm shipped four 50-ton carloads from the two properties on October 4. They are now drilling and have extended ore vertically to a 100-foot depth. Two of the firm's core drills are doing the drilling.

Comstock Uranium-Tungsten Company Inc. of Elko, Nevada is in the process of reconditioning a mill it purchased from Burt Hayes and associates. Crushing and tabling facilities will be increased. The firm took over the *Haggard and New* mine in Grant County, Oregon earlier this year. A development tunnel is being driven to open the orebody at a depth of about 40 feet below the present workings.

A large chrome processing plant reportedly is about ready to go into production six miles north of Bandon, near Whiskey Run, Oregon. Erected by *Wright Construction Company* of Lansing, Michigan, the plant will process upgrade beach sands so that their chrome content will meet the 42 percent government specification for purchase.

Northwest Mining Company is open-pit mining tungsten ore on Foots Creek, Jackson County, Oregon, and concentrating it in the leased *Laughlin Alloy Steel Company* mill at Eagle Point. Partners in the firm are William D. Rhea, Ivan W. Lanham, Glenn W. Bradley, and C. R. Jackson.

Dahl Uranium Mines, Inc. has been granted the first Defense Minerals Exploration Administration contract in the Spokane area of Washington. The government agency will pay $3,225 of the

FEEDOWEIGHT

A self-contained conveyor feeder scale that feeds, weighs and totalizes. Use the Feedoweight for better control of ball mill grinding. It accurately controls FEED by WEIGHT, automatically. Made in sizes to meet all tonnage requirements.

MERRICK SCALE MFG. CO.

171 Summer Street

PASSAIC NEW JERSEY

Newmont Mining Corporation

announces the removal of its

New York offices to

300 Park Avenue, New York 22, N. Y.

Effective
October 15, 1955

Telephone
PLaza 1-3060

$4,300 cost of a bulldozer exploration project at the company's property near the producing *Daybreak* uranium mine. The firm has reported uncovering high-grade autunite in a narrow vein and at last report was negotiating with the U. S. Atomic Energy Commission for a shipping contract. H. J. Tibbits, Spokane, is president, and William D. Weaver, general superintendent.

Germania Consolidated Mines, Inc. has uncovered a series of new tungsten veins in bulldozing a radioactive area at its southwestern Stevens County property in Washington. Four hundred pounds of direct-shipping ore was taken from one point. Since 1951, the firm has been paid for 561 units of tungsten contained in 19,921 pounds of concentrates. The company also reports that it has found uranium on its property in Lincoln County and is now diamond drilling with large equipment to locate the deposit at greater depth.

Dawn Uranium and Oil Company has cored autunite in three holes drilled at its *Weiber-Wisemore* lease in the Mount Spokane district, Washington. The radioactive zones were found at depths of 300, 250, and slightly under 200 feet. The site is three miles northwest of the producing *Daybreak* uranium mine. Vivian Brothers, Kellogg, are drilling under direction of Peter W. Mourer, consulting engineer. C. R. Echlin, Spokane, is secretary-treasurer.

Square Deal Mining and Milling Company, Wallace, Idaho, has found uranium mineralization in surface bulldozing on the Spokane Indian Reservation, southwestern Stevens County, Washington, and has started core drilling to determine if the showing will become commercial at depth. The company is an affiliate of *Golconda Lead Mines*, Wallace.

Northwest Mining Syndicate has found additional iron ore at the old *Electric Point* lead mine near Leadpoint, Stevens County, Washington. One deposit on the property is estimated to contain 1,000,000 tons. Fred M. Viles, Spokane, is managing director.

Tungsten Uranium Mines, Inc. has added 35 mining claims to its extensive holdings surrounding the *Germania* tungsten mine in southwestern Stevens County, Washington. A crew is seeking the source of uranium-bearing float found on the Germania property, where tungsten ore is being mined and milled on a two-shift basis. C. A. Voight, Spokane, is president.

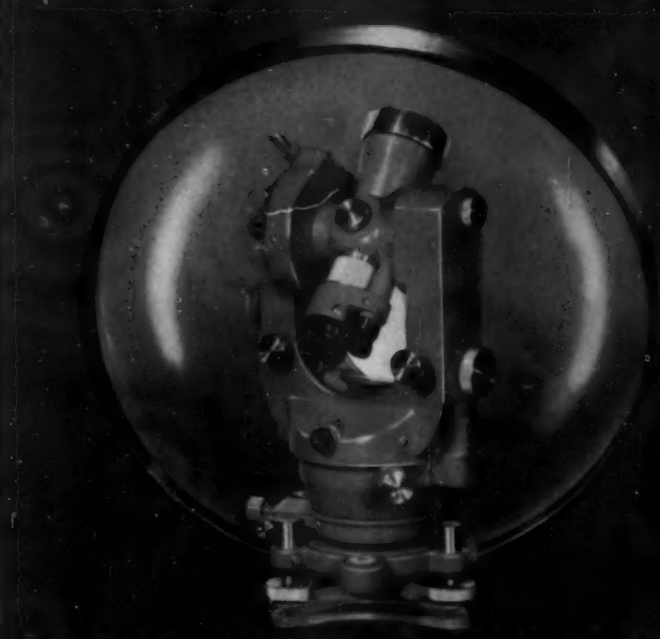
U & W Uranium, Inc. has added seven mining claims and some leased land to its holdings in the Orient district, Stevens County, Washington. Thomas J. Linton, Spokane, is company president.

Highnoon Uranium Mines, Inc., Newport, Pend Oreille County, Washington, is building a road into claims in the Rocky Creek area and is planning an extensive drilling project along with a public stock issue. C. N. Junkin, Hermiston, Oregon, has been named field supervisor. Charles Pulford is secretary.

Anaconda Uranium Corporation and *Northwest Uranium Corporation*, both of Spokane, Washington, have been organized to explore and develop properties in the Mount Spokane district and in Ferry County. Incorporators were John A. Dunn, Calgary, Alberta, oil man; C. L. Lyon, Spokane real estate broker; and Richard H. Godon, radio station manager.

WILD®

HEERBRUGG



WILD T-1 OPTICAL REPEATING TRANSIT

Here is unmatched speed, precision and convenience. Optically and mechanically, it is designed for fast set-up, error-free reading, maximum versatility, and for day or underground use under the most rugged conditions.

TWO MODELS AVAILABLE

New Model

Reading direct to 20 seconds, interpolation to 10 seconds.

Standard Model

Reading direct to 1 minute, estimation to 6 seconds.

Priced at $718 and $700 respectively, F.O.B. Port Washington, N. Y. Tripods extra.

WRITE FOR DETAILED INFORMATION . . . and use the Wild Heerbrugg advisory services without obligation.

WILD HEERBRUGG INSTRUMENTS, inc.

Main at Covert Streets · Port Washington, N.Y. POrt Washington 7-4843

SALES · FULL FACTORY SERVICES

LIQUID ASSETS FOR MINES

Wherever mining operations call for water, your most practical answer is Naylor Spiralweld pipe. Its light weight makes it easier and more economical to handle and install, even over rough terrain. Its exclusive lockseamed, spiralwelded structure provides the extra strength and safety required for uninterrupted traffic. For water, for air, for discharge, for tailings and for hydraulicking, Naylor pipe offers all the economy of light weight without sacrifice of performance. Write for Bulletin No. 507.

NAYLOR PIPE

NAYLOR PIPE COMPANY

1242 East 92nd Street, Chicago 19, Illinois

Eastern U. S. and Foreign Sales Office: 350 Madison Avenue, New York 17, New York

NORTHWEST

Blue Star Mining and Survey Corporation, Spokane, Washington, has been incorporated for $150,000 by Stanley Hay Sr. of Prosser, and S. M. Gardner and Rita Gardner of Loon Lake. It is planned to develop radioactive showings on mining claims located in the Deer Lake and Chewelah areas by Mr. Gardner. Mr. Hay is president and Mr. Gardner is vice president.

C. G. Sherwinn of Opportunity, Washington; E. S. Saunders, Bellevue; and G. D. Florsheim, Antwerp, Belgium, filed articles of incorporation for *Nometco, Inc.*, to deal in nonmetallic minerals for industry. The Opportunity firm was capitalized for $50,000.

Red Hawk Gold Mines, Ltd. of Vancouver, British Columbia, formed to develop a property in British Columbia's Bridge River gold district, has optioned 29 mining claims in the southern Stevens County, Washington uranium field. They are four miles north of the Midnite uranium mine in the Spokane Indian reservation. Everett Houghland, Republic geologist, did geological mapping, and surface bulldozing is now under way. Elmore Meredith, Vancouver attorney, is company president and Jean Webb, Vancouver, secretary.

United Uranium Corporation has been organized as a joint venture by *Dahl Uranium Mine, Inc., Lands, Inc., Trimine Company*, and *Lucky Four Mining Company*. The firm has state leases on 2,880 acres on the east side of Priest Lake, Idaho, where Spokane prospectors operating as Trimine and Lucky Four mining companies found pitchblende showings in pegmatites and fine grained granites. Geologic mapping was to be followed by drilling.

A finely divided uranium mineral believed to be pitchblende has been found in ore samples from the holdings of *Sunset Mines* near Kettle Falls, Ferry County, Washington. Host rock is biotite gneiss. The firm has moved some mining equipment to the property from its lead-zinc mine in the Pine Creek district of Idaho's Coeur d'Alene mining region. Bulldozer and open-pit work has shown extensions of the radioactive zones. Clyde R. Bellows, Seattle geologist, at last report was laying out a drilling program to determine if the ore is present in commercial quantities.

Schee-Uranium Mines, Inc. has been organized in Ferry County, Washington, by James A. Stack of Oroville and Stuart G. Mayo and Ethel Mayo of Tonasket. Capital stock totals $150,000.

Sierra Silver Lead Mining Company, Spokane, Washington, has acquired a prospecting and mining lease on land owned by William A. Anderberg in northwestern Stevens County.

National Metallurgical Company has leased land from Selmer J. Bakken and Frank M. Jarvis near Valley, Stevens County, Washington.

Mr. and Mrs. Edwin N. Klemgard of Pullman; Wayne Bergquist of Kettle Falls; Nick Dukich and S. I. Schrock, and Ben Schoenwald, Spokane, were among recent claim filers at Colville, county seat of Stevens County, Washington.

Monazite containing rare earths and uranium has been found on Happy Hill, four miles northwest of Okanogan, Washington, by *Northwest Prospectors Company*. The company has about 15 claims and some leased land.

Rocky Mountain Minerals Meeting Draws Big Crowd

The record crowd attending the Second Annual Rocky Mountain Minerals Conference at Salt Lake City, Utah on October 6 through 8 once again proved that a well organized and carefully planned program, with top technical speakers and interesting field trips, is the way to have a successful mining meeting.

The conference, sponsored by the Utah Section of the AIME, not only drew a record crowd of Utah miners, but a surprisingly large crowd from such far away and widely scattered points as northern Michigan, Vermont, southern California, and northern Washington.

Uranium, quite naturally, led in interest, with papers by Ernest T. Thurlow, Manager, Salt Lake Exploration Branch, AEC, on "Uranium Occurrences West of the Colorado Plateau"; J. Fred Johnson, consulting mining engineer, Salt Lake City, on "Uranium Mining Methods"; and Clement K. Chase, chief metallurgist, Uranium Reduction Company, Moab, Utah, on "Beneficiation of Utex Ores."

The synthetic scheelite plant of the Salt Lake Tungsten Company was described by manager Blair Burwell, Jr. The growing importance of rare metals was outlined by M. H. Kline, vice president, Rare Metals Corporation of America, Salt Lake City.

Success of this meeting points to similar future fall meetings in one of a number of places including Moab, Utah; Grand Junction, or Ouray, Colorado.

The *United States Atomic Energy Commission* has restored 31,319.97 acres to the public domain in Utah and Colorado. The acreage includes 27,679.97 acres in the Thompson's district of Grand County, Utah; 920 acres in the Slick Rock district of San Miguel County, Colorado, and 2,720 acres in the Gateway district of Mesa County, Colorado. The land, which had been withdrawn for use by the AEC in its uranium exploration program, will be opened to claim location on January 18, 1956.

Colonial Uranium Company has acquired control of the *Thorium Corporation of America* with acquisition of all outstanding shares in TCA. The two firms are planning to construct milling facilities for processing thorium ores in Colorado, Wyoming, and New Mexico. Thorium Corporation currently has a $1,000,000 contract with *Lindsay Chemical Company* for production of thorium concentrates.

Bids have been accepted for the mine, 700-ton-per-day mill, 10,000-foot aerial tram and other equipment and supplies of the *Shenandoah-Dives Mining Company* at Silverton, Colorado. Operations at the lead-zinc property were closed down last year. In 1953 the firm had suspended mining activity but later reopened the Shenandoah mine when the company was granted a $250, 000 *Defense Minerals Exploration Administration* loan. Edwin A. Larson, resident manager, had supervised this DMEA exploration program.

Utex Exploration Company has purchased fluorite deposits in Chaffee and Jefferson counties, Colorado. Selling the properties was Frank A. Mansheim, who said that the deposits in Chaffee County are located in Brown's Canyon and on Poncha Pass.

Kanarado Mining & Development Company has reopened the *Carter* mine at Ohio City, Gunnison County, Colorado. One of the area's oldest mining operations, the mine has produced gold, silver, lead, and zinc in its 55-year history. At present six men are employed at the mine. W. F. Kelsey is manager.

Sunset Mines, a zinc-lead producer in northern Idaho's Coeur-d'Alene mining region, has leased a 20-claim uranium prospect in the La Sal district, Montrose County, Colorado. The claims were obtained from *Spokane Ventures Investments, Inc.* Sunset plans to drill the Saltwash member of the Morrison which outcrops on most of the claims. C. R. Bellows, Seattle, Washington, is consulting geologist.

Uranium Corporation of America, a New Mexico corporation which has set up field headquarters in Cortez, Colorado, is now drilling its 21 Queen Anne claims in Monument Canyon, 25 miles west of Dove Creek, Colorado. The property is in San Juan County, Utah, near the Colorado line. From 4,000 to 6,000 feet of drilling is planned on the group.

Ranger Uranium Exploration and Development Company, Inc., Vernal, Utah, presently is shipping from its *Miller Creek* properties in Moffat County, Colorado. Preliminary drilling on company properties near the new AEC mill site near Maybelle, Colorado disclosed an undetermined amount of low-grade shipping ore. A stripping operation will begin as soon as the new mill starts buying ore. President of the comapny is Bill Daugherty.

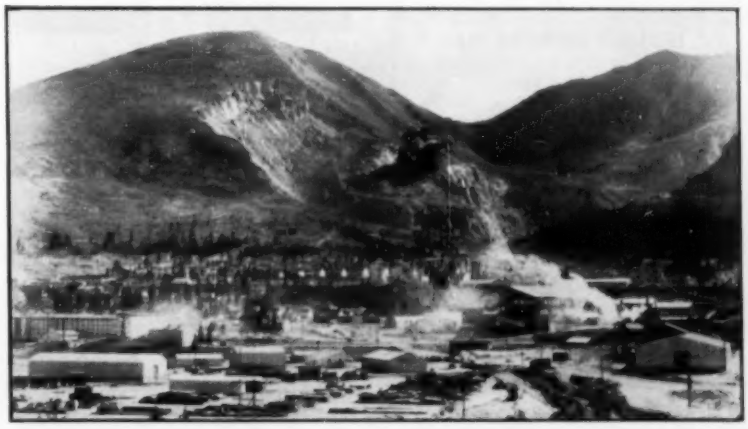
Atlas Uranium Corporation, Moab, Utah, has obtained 3,500 acres in La Plata County, Colorado on the Durango anticline. The firm has uranium rights on two of the three tracts in the block, and oil and gas rights on the entire block.

Richardson Mining Company, Inc., with offices in Denver and Ouray, Colorado, has been organized to work property north and east of Ouray. Frank O. Richardson is president and general manager.

Inland Empire Uranium Company, St. Louis, Missouri, has leased a 50-ton tungsten mill and a group of claims from *Mining Ventures, Inc.*, Pueblo, Colorado. The property is located between Salida and Buena Vista in southwestern Colorado. Operations were started by Inland Empire last month, and the firm has established field headquarters at Canon City, Colorado.

Francis Petry, amateur uranium prospector from Pueblo, Colorado, and four partners have discovered a uranium- and thorium-bearing lode near Westcliffe in south central Colorado. Chemical analysis of samples from the deposit revealed high percentages of both uranium and thorium, some silica and iron ore, plus cerium and other rare earths. The Petry group has staked approximately 100 claims in the area.

Mountain Fuel Supply Company now has between 300 and 500 uranium claims under option in southwestern Wyoming and northwestern Colorado. Approxi-



Climax Breaks 2,500,000 Tons in Single Blast

Climax Molybdenum Company on October 2 at its Climax mine, Lake County, Colorado broke an estimated 2,500,000 tons of low-grade ore with 81,614 pounds of dynamite. The blast broke an arch 600 feet long, 450 feet wide, and 300 to 700 feet high, or 250,000 square feet, in the footwall section of the ore body above the Phillipson level. Smoke and dust from the blast can be seen in the photo above just under the saddle to the right of Bartlett Mountain. Climax's mine and mill are shown in the foreground. This arch had formed as block caved ore had been pulled out from under it. The arch had created a mining problem, as earlier efforts to break it had failed, and the danger of air blast was ever present. The successful shot was made by blasting a series of underground powder tees at one end of the arch. This cut off the support and the remainder of the arch then collapsed. The shot was purposely detonated on Sunday when all mining activity had been suspended and the mine cleared of all employees. The ore caved to the tops of the draw points exposing a tremendous hole adjacent to the existing surface caves on Bartlett Mountain. Only damage to the mine from the air blast as the arch caved was to two mine ventilation fans. John M. Petty, mine superintendent, was in charge of underground powder tee preparation and the loading and detonating of the powder.

mately 1,200 to 1,500 feet of drilling are being completed each week by the firm.

Equitable Uranium Corporation has been formed in Aurora, Colorado. The firm has properties in San Miguel County, Colorado; Grand County, Utah; and Sweetwater and Fremont counties, Wyoming. Included in these holdings is the *Governor Mine* in Bishop Canyon, San Miguel County, Colorado, a World War II vanadium producer. Mining equipment has been moved onto the property and exploration work is now underway.

"The all-purpose counter for the prospector & professional uranium operator by the most experienced supplier to the uranium industry."

MODEL SC-10 .... "Does everything"

COMBINATION SCINTILLATION COUNTER
For Field — Mobile — Airborne
Drillhole Logging
Thorium Determinations
Extreme sensitivity — 18 ranges
As pictured $595.00

Optimum Model SAB-7 Airborne Scintillation Counter $2810.00
New Model 107C Geiger Counter $149.50
Immediate Delivery on
All Types: Geiger & Scintillation Counters — Drills — Drillhole Probes

ENGINEERS SYNDICATE, LTD.
5011 Hollywood Blvd., Hollywood 27, Calif.
HOrmsby 3-9284

Sales & Service Branches:
MOAB, UTAH—GRAND JUNCTION, COLORADO

URANIUM-TUNGSTEN-MERCURY
ZIRCONIUM-ZINC

Prospecting Information! Latest News and Data on Equipment and Methods

Ultra-Violet Products, Inc.
Dept. W San Gabriel, California
Please send me Prospecting information, description of equipment available, and name of nearest dealer.
Name
Address
City State

IF YOU'RE PROSPECTING FOR ANYTHING, YOU NEED AN ULTRA-VIOLET MINERALIGHT

HERE'S WHY! The Mineralight shows traces of uranium not sufficient to excite other responses, and detects minerals which are often found with uranium ore. By itself or teamed with a Geiger or Scintillation Counter, Mineralight is a must.

SEE THE MINERALIGHT IN ACTION

Your MINERALIGHT dealer can demonstrate the various models for you and give you complete information on Geiger counters, scintillation counters, and other prospecting equipment, as well as the latest data on uranium prospecting. See him today or write for valuable bulletin —"Uranium Prospecting with Magic Mineralight".

ULTRA-VIOLET PRODUCTS, INC.

SOUTH DAKOTA

The Edgemont, South Dakota uranium processing plant of *Mines Development, Inc.*, Denver, Colorado is expected to be ready for operations by the spring of 1956. Preliminary buildings and facilities will be completed by the end of this year by the *Western Knapp Engineering division* of *Western Machinery Company*, contractors for construction of the plant. The new mill will use the ion-exchange process, which has recently been developed by the United States Atomic Energy Commission. Superintendent of Operations for Mines Development at Edgemont will be H. L. Hazen of Grand Junction, Colorado.

Bald Mountain Mining Company, Trojan, South Dakota, is milling an average of 250 tons of gold ore per day from its four mining operations, the *Decorah, Portland, Clinton* and *Dakota* mines, in the Black Hills area of South Dakota.

Ohio Oil Company of Casper, Wyoming is core drilling for uranium on its leases in the Cave Hills of South Dakota. H. D. Hoopman is geologist and superintendent of operations.

UTAH

At the *Salt Lake Tungsten Company's* synthetic scheelite plant, a major expansion in capacity has just been completed. In addition, a new unit is being constructed to produce ammonium paratungstate, which will greatly increase the market for western tungsten. The Salt Lake City, Utah plant is buying more custom ore and concentrates each month from shippers and small milling plants in the western United States. Salt Lake Tungsten is operated and partly owned by *Minerals Engineering Company* of Grand Junction, Colorado.

Production has been started at the *Radon* claims in the Big Indian district, San Juan County, Utah, by *Hecla Mining Company*, Wallace, Idaho, the operating firm. Full production must await completion of working drifts and crosscuts in the bedded uranium deposit discovered in drill holes put down by *U & I Uranium*, Kellogg, Idaho, which subsequently was merged into *Federal Uranium Corporation* of Nevada. Production is from the 600-foot level. Hecla sank the shaft to a depth of 690 feet.

Extensive development work is now being carried out at the *Cherokee* phosphate mine of the *San Francisco Chemical Company*. Located on the Bear River Valley side of the Crawford Mountains in Utah, a 2,300-foot adit is being driven at the underground mine. It will enter both the west and east limbs of the main structure. A compressor station, mine change house, and repair shop at the portal entrance have been constructed at the Cherokee. *Utah Power and Light Company* is providing a 44,000-volt substation at the mine. General manager and president is D. L. King of Montpelier, Idaho.

Elk Ridge Uranium Company, Salt Lake City, Utah, has blocked out uranium ore reserves by drifting and crosscutting at the firm's mine in San Juan County, 29 miles west of Blanding, Utah. Main tunnel is into ore at a distance of 528 feet. Cross-cutting has established a channel in the Shinerump formation about 130 feet wide. Ore values have averaged 0.28 percent U_3O_8 in sampling along faces in the mine.

Monogram Uranium and Oil Company has sunk its incline 470 feet on the Green River, Utah uranium property it is leasing from *Four Corners Uranium Corporation*. The firm expects to reach ore within the next 25 feet, and when completed the incline is expected to be the longest on the Colorado Plateau. Cross section is 9 feet by 9 feet. Rock is now being hauled out by an Allis Chalmers HDS front end loader.

Merger of *Atlas Uranium Corporation* and *Paramount Uranium Corporation*, with Atlas as the surviving firm, was recently approved by stockholders in Moab, Utah. Atlas is purchasing all Paramount assets under the agreement, and Paramount stockholders receive one share of Atlas for each 15 shares of Paramount. Atlas acquired more than 100 uranium claims in the deal, including the *Montezuma* mine in San Juan County, Utah, which has been shipping ore since last December. Atlas already has one producing mine, the *Last Chance* mine in Brown's Hole, San Juan County. Atlas president is J. C. Burgess, Moab.

Temple Mountain Uranium Corporation is shipping lead ore concentrates to the Midvale, Utah smelter of the *United States Smelting & Refining Company*. Production at its lead properties in Juab County, Utah is now at the rate of 15 tons per week. The company hopes to raise this output to 30 tons.

Blue Goose Mining, Inc., has contracted for preliminary drilling on its *Blue Goose* and *Lucky Lady* claims in the Circle Cliffs area of Garfield County, Utah. L. E. Murray of Farmington, New Mexico is firm president.

Rimrock Uranium Mines, Inc., Grand Junction, Colorado, has started production at its 18 claims near Moab, Utah. The firm also has property near Loa, Utah and Meeker, Colorado.

Howe Sound Company, lead-zinc-silver and cobalt producer and processor, is planning to erect a research and experimental center near Salt Lake City, Utah. A temporary laboratory has already been set up by *Calera Mining Company*, Howe Sound subsidiary, under the direction of W. M. Fassel, former associate professor of metallurgy at the University of Utah. Dr. Fassell will act as director of research for Howe Sound. The research center will concentrate on solving metallurgical problems encountered by Calera at its Garfield, Utah cobalt refinery, but beneficiation problems of other Howe Sound operations will also be studied.

Phillips Petroleum Company has agreed to conclude 40,000 feet of drilling on 81 claims of the *Utah Premier Uranium Company* and *Republic Uranium*

Company, Salt Lake City, Utah firms. Properties are located in the Big Indian district of San Juan County, Utah. The joint operating agreement provides that Phillips will receive 50 percent interest and will handle management if commercial ore is found. C. N. Holmes, head of Phillips' strategic minerals division, is directing exploration activities.

Colorado Henry Mountain Plateau Uranium Company has been formed to develop a 2,600-acre uranium field in Utah. J. Edwin Goldman, Douglas, Arizona hotelman, heads the new company.

Royal Uranium Corporation has stockpiled approximately 3,000 tons of uranium ore at its Indian Creek district properties 25 miles southwest of Moab, Utah. The firm has an agreement to ship 1,200 tons of ore per month to the Monticello, Utah AEC mill. Ore has been assaying 0.34 percent U_3O_8, but Royal plans to blend this grade down. George H. Patterson is president of the corporation.

Abajo Uranium Company, Salt Lake City and Moab, Utah, now holds title to 106 mining claims covering 2,000 acres in Utah and Colorado. Forty of the claims are located in the Blanding, Utah area over Morrison horizon, and 60 claims are in the Seven Mile area over Chinle-Shinarump horizons. Robert R. Hughes is president of the firm. Other officers include: Max D. Howcroft, vice president; Byran C. Watts, secretary-treasurer, Grant L. Shumway, geologist and mining engineer; Glenn Rowland, airborne exploration.

The *Sunburst Mining Company*, Green River, Utah, is shipping uranium ore to the *Climax Uranium Company* mill in Grand Junction, Colorado. Sunburst has 95 producing claims in the Morrison formation. Mine camp is located 49 miles south of Hanksville, Utah. Jesse Ekker of Hanksville is mine foreman. Officers of Sunburst are San Dechearo, San Angelo, Texas, president; Tom Connor, Abilene, Texas, vice president; Edward Creel, Grand Junction, Colorado, business manager.

New York & Honduras Rosario Mining Company, New York City, has revealed that drilling on the company's uranium claims in Colorado and Utah began in July. No commercial ore findings have been reported as yet.

New mining corporations filing in Salt Lake City, Utah include: *Wilma K. Uranium Mining Corporation*, *Black Bear Consolidated Mining Company*, and the *T. Moran Uranium Company*.

Byrd Uranium Corporation, wholly owned subsidiary of *Byrd Oil Corporation*, has announced acquisition of six additional uranium claims in Utah. *Great Divide Uranium Corporation's Dry Valley* mine, in which Byrd Uranium has a one-fourth interest, is now producing 300 tons of ore per month.

Diamond Ace Uranium Corporation has been acquired by *National Uranium Corporation of Utah*. Both companies have been actively producing uranium and the merger of properties now gives national the following holdings: *Chief* claims, 23 miles from Moab, Utah, with 45 claims and two producing mines; *Kings*, *Aces* and *Olsen* claims, totalling 36 claims and adjoining the former *Delta* mine of Vernon Pick; 303 claims originally owned by National. A new ore strike was recently reported at the company's *Daisy June* claim numbers 1, 5, 6, 7.

1885

70 TO GROW ON...

1955

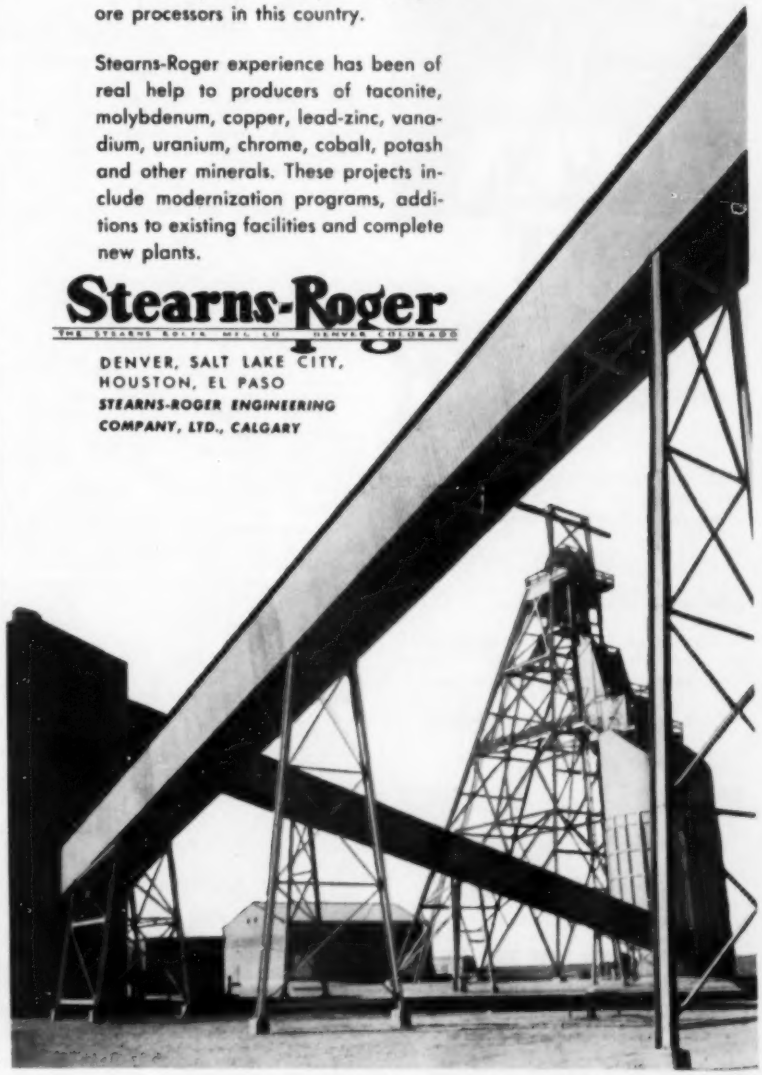
Seventy years of close association with mining and metallurgy have provided Stearns-Roger a vast store-house of technical process and plant information. Starting with plant location studies and the development of flow sheets, complete mineral processing plants have been designed and built, in whole or in part, for many of the major ore processors in this country.

Stearns-Roger experience has been of real help to producers of taconite, molybdenum, copper, lead-zinc, vanadium, uranium, chrome, cobalt, potash and other minerals. These projects include modernization programs, additions to existing facilities and complete new plants.

Stearns-Roger

THE STEARNS ROGER MFG. CO. DENVER COLORADO

DENVER, SALT LAKE CITY,
HOUSTON, EL PASO
STEARNS-ROGER ENGINEERING
COMPANY, LTD., CALGARY



This is

SELECTIVE

OPEN PIT MINING

Isbell experience in volume earth moving and selective open pit mining is long established... has moved over 200 million tons.

Isbell teams have successfully mined or stripped copper, gold, lead, sulphur, manganese, tungsten, uranium, zinc, and non-metallics.

Isbell has available the equipment, engineering, management, and operating personnel for jobs anywhere.

ISBELL
CONSTRUCTION COMPANY

BOX 2351 RENO, NEVADA TELEPHONE 3-7135

WYOMING

Utah Construction Company will handle the mining operations of *Lucky Mc Uranium Corporation's* holdings in the Gas Hills area of Wyoming. Under an option agreement signed by the two companies, Utah Construction will be in charge of work pointing toward construction of a large mill in the area. When all conditions of the option are fulfilled, it is believed that Utah Construction will hold approximately 60 percent interest in Lucky Mc.

Moab Mines, Inc. has engaged *Utah Drilling Company* to drill its properties in the New Discovery area 20 miles north of Douglas, Wyoming. Moab Mines has a total of 37 claims in the area. A fenceline pattern is being used, and up to 10,000 feet of drilling is contemplated.

Shawano Development Corporation, New York, and *St. Michael's College Foundation, Inc.*, Santa Fe, New Mexico, have reported a uranium and selenium deposit near Baggs, Wyoming. The strike was made on a group of 17 claims known as the Poison Basin group. The claims are owned by Shawano but operated by the foundation on a fee basis.

Aliob Mining Company has shipped its first two loads of ore to the AEC buying station in Riverton, Wyoming. The firm has mining properties in the Gas Hills area in Natrona County. About 3,000 tons of uranium ore have been revealed by development work. President of the company is Alfred Nostrum, Thermopolis, Wyoming.

Lost Creek Oil & Uranium Company has driven a drift of more than 200 feet into a fault zone on the *Sno-Ball* group of uranium claims in the Crooks Gap area of central Wyoming. The firm recently acquired the mine from previous owners who had produced more than 50,000 tons of surface ore from the property. Robert Adams, Rawlins, Wyoming, is president.

An appropriation of $300,000 in the budget of the *Atomic Energy Commission* has been approved by Congress for construction of a uranium ore access road to the Gas Hills area of central Wyoming. The road will be some 50 miles in length.

The *McAlester Fuel Company*, with veteran miner Ben Sharp in charge, is operating the first underground uranium mine in the Gas Hills area of Wyoming. A drift into a hill on the *Yellowbuck No. 2* claim has progressed more than 50 feet, in ore all the way, and the ore is reported increasing in both size and grade as drifting continues.

The *Mack-Lang Uranium Corporation*, Lander, Wyoming, has begun shipping ore from its claims on the southern flank of Crooks Mountain in southeastern Fremont County to the Riverton AEC buying station. Ore is from the ox-bow meanders of an ancient drainage channel. It is primarily sandstone with considerable petrified wood with uranium mineralization included. Two substantial ore bodies have been blocked out on the company's 169 claims and a third ore block has been partially delineated.

INCREASE THE LIFE OF YOUR PREPARATION SCREENS 500%

Kleenslot
WEDGE WIRE
PREPARATION SCREENS

Replace wire cloth in the elimination of blinding. Primary screening of raw 5 x 0 and 6 x 0 coal to remove the ¼ x 0 for dry cleaning is no longer a problem at the four West Virginia plants of the Red Jacket Coal Corporation. Kleenslot Wedge Wire Screens have brought about this efficient change over. Since 1951 they have brought about continuous money saving in material and labor for replacements and have relieved plant operators of the need for frequent inspections to detect blinding and holes in the screen cloth.

CUT REPLACEMENT COSTS • MINIMUM SHUTDOWN TIME

It costs nothing to obtain a Wedge Wire recommendation. We will gladly furnish this service without obligation. Remember, Kleenslot Wedge Wire Screens are best by every test, so why not specify the best.

Send for free completely illustrated catalog today.

Wedge-Wire
CORPORATION
Gas Street at Nickle Plate R. R.
Wellington, Ohio

Kaiser Will Expand Iron Ore Beneficiation Facilities at Eagle Mountain, California

Kaiser Steel Corporation will build a multi-million dollar addition to its iron ore mining facilities at Eagle Mountain, California, to upgrade further the already high quality iron ore being mined there. The new mill will supplement the beneficiation plant that went into operation last year. (See MINING WORLD, September 1954, page 105.)

The shipping grade of the ore presently runs about 55 percent iron content; this will increase to over 60 percent with the new facilities. The beneficiation plant presently upgrades only the larger fraction of the ore mined. About 40 percent of the fine ore, in particle less than one quarter inch size, has been shipped unbeneficiated pending determination of the most suitable methods of concentration.

The new concentrating mill to be constructed will consist of two separate systems for concentrating the ore, all housed in a building 150 feet by 60 feet by 60 feet. Each system will begin with delivery of the fine ore by conveyor belt to wet magnetic concentrators. That part of the fine ore which can be attracted to a magnet (approximately half of the Eagle Mountain ore is magnetic) will be separated out at this stage.

The non-magnetic ore (and waste) rejected from the first wet magnetic concentrators will pass to a four-cell pulsating jig. This is a movable bed with a slotted screen upon which a "ragging" of a two or three layer depth of ⅝ inch steel balls is placed. The heavier, iron-bearing material in a water solution will sink to the bottom of the jig, while the lighter waste rock is carried by the water over the top of the last cell weir and is discarded.

The non-magnetic ore rejected from the second wet magnetic concentrators will be dewatered and then separated into two sizes. The larger size (¾ inch by 48 mesh) will be fed to a series of six "cyclone" units, 10 inches in diameter. Here the ore will be mixed with a magnetic media (very fine powdered iron ore and water) forced into a cone at a pressure of 25 pounds per square inch. The rich iron ore is separated by centrifugal force in the cone while the waste product is taken off at a lower level.

The finer of the two materials from the preliminary sizing process (48 mesh by 0) is pumped to a series of spiral-type classifiers where it is further concentrated by removal of the remaining waste rock.

Other benefits to be obtained from the installation include reduced freight charges (more iron shipped from Eagle Mountain to Fontana per freight dollar) and reduced ore handling and overall costs.

Included in the cost figures are provisions for auxiliary facilities such as electric sub-stations and ore conveying systems, and for the construction of nineteen three-bedroom homes for the employees who will man the plant.

Kaiser Engineers, a division of the Henry J. Kaiser Company, will design and construct the plant and auxiliary facilities.

New Mexico, Southwest Mining Associations Meet

Approximately 700 persons attended the El Paso Convention sponsored jointly by the Southwest International Mining Association and the New Mexico Mining Association in El Paso, Texas, September 29 through October 1.

During the convention the New Mexico Mining Association held its annual meeting, at which J. B. Knaebel, manager of New Mexico operations, The Anaconda Company, was elected president. The New Mexico group adopted a series of resolutions including recommendations for a flexible tariff to protect the mining industry, continuation of government stockpiling, tax relief for the industry as a risk enterprise, and a study of the present AEC discovery bonus to uranium miners on the first 10,000 pounds produced from each deposit. Miners with ore deposits scattered over large contiguous groups have asked for further study on this problem.

Three technical sessions were held at which the following papers were read: "Electrolytic Precipitation of Copper with Iron," Dr. J. C. Rintelen, Jr., Texas Western College; "Leaching of Mixed Ores at Inspiration," C. B. Kettering, Inspiration Consolidated Copper Company, Inspiration Arizona; "The Importance of Geologic Information and Ore Testing to Mill Design," H. P. Nicholson, Texas Western College. "Ventilation and Air Conditioning of the Magma Mine" A. B. Short, Magma Copper Company; and "Recent Developments in Deep Drilling Practice" W. W. Long, New Mexico Institute of Mining and Technology. "The Domestic Uranium Production Program," Sheldon P. Wimpfen, U. S. Atomic Energy Commission, Grand Junction, Colorado; "Geologic Thinking in the Discovery and Extension of Mineral Deposits," J. E. Allen, New Mexico Institute of Mining and Technology, Socorro, New Mexico; "Southwestern Ore Districts in the Structural Framework," Dr. E. B. Mayo, University of Arizona, Tucson, Arizona; "Uranium at Mi Vida Properties," C. A. Steen, Utex Exploration Company, Moab, Utah.

The photograph shows the Eagle Mountain plant as it is today.

New Mexico Bentonite Plant in Operation

Arimex Chemical Company has started operation of its new $250,000 processing plant for bentonite at Gallup, New Mexico. When in full operation, the plant can prepare and package 45,000 pounds of bentonite a month, working three shifts a day. The bentonite is mined from a deposit near Sanders, Arizona and shipped to Gallup in gondola cars.

Western Minerals Meeting Scheduled for This Month

The Western Governors Mineral Policies Conference will get underway in Sacramento, California November 7 and 8. Delegates from the 11 western states, South Dakota, and Alaska will participate in drawing up proposals for a national minerals policy.

Policy section meetings on taxes, lands and water, research, public information, and mineral economics will be held. There will also be sessions on mineral commodities. Keynote speaker will be Governor Goodwin J. Knight of California. United States Senator Thomas H. Kuchel (California) will also address the group. Conference co-chairmen are DeWitt Nelson, California Director of Natural Resources, and S. H. Williston, chairman of the western governors mining advisory council.

ARIZONA

Cataract Uranium Mining and Exploration Corporation, after stockpiling about 400 tons of uranium ore at its mine in Gila County, Arizona, has started shipping to the buying station operated by the *American Smelting and Refining Company* for the Atomic Energy Commission at Globe, Arizona. Cataract has completed the first of six planned 300-foot adits on one of its claims on the

375 acres it owns near Buzzards Roost in the Sierra Ancha mining district.

Lewisohn Copper Corporation has been formed to mine and concentrate copper on 46 patented lode claims in the Helvetia district of Arizona. Frederick Lewisohn is chairman; Richard Chilson, president and treasurer; and Boyd Morse, vice president and secretary.

The *Esperanza Corporation* has acquired the *McAllister Assay Office* in Kingman, Arizona, and is ready to receive samples for assaying. The company is planning to install an ore sampling mill and to buy ores in small or large lots, and expects to be ready to enter that phase of business early in the fall. The company's engineers have examined a number of mines in the area and have acquired several worthy of development, some of which are now producing. Wells Robertson is president of the company; A. H. Ellett is general manager.

Frontier Mining Company has made its first shipments of uranium ore from its *Sunny Side* claims on the Navajo Indian Reservation in Apache County, Arizona. Charles Bristle, president of the company, reports that shipments of 15 tons daily are being sent to the AEC mill at Shiprock, New Mexico operated by *Kerr-McGee Oil Industries, Inc.*

Arizona-Golconda Metals Inc. is reopening the old *Golconda* mine near Kingman, Arizona, which was abandoned in 1917 when fire destroyed the mill and ore bins. Work is presently being concentrated on the opening of one of the four original main tunnels, which leads to the Golconda shaft where ore is known to exist. The tunnel has been cleared of muck and timber, and is rapidly being pushed ahead. Track has been laid in the tunnel, and a locomotive and ten cars are in operation. Studies are under way to determine the most economical methods of treating the complex ore.

The *Arizona Mining and Development Company* is stockpiling ore from its *Rattlesnake* mine and other cinnabar claims in the Sunflower district of Arizona. According to Frank O. Ratcliffe, president, the company is installing a 50-ton mill designed to handle custom ores as well as the company's own production. Archie Griffith, formerly of Tucson, is mine superintendent.

The *Hualpai Company* has taken a lease on the *Boriana* tungsten mine, owned by *Dye and Bathrick*, near Yucca, Arizona. The firm moved in an HMS separator and table concentrator from the Coeur d'Alene district in Idaho, and is currently treating 200 to 300 tons daily of gob from older stoping operations. The bulk concentrate—wolframite, scheelite, and chalcopyrite—is sold to tungsten operators in Bishop, California. Hualpai Company is a co-partnership of M. W. Cox, Frank McCarthy, and C. B. Aitchison.

with
SYNTRON

Counter Balanced • Dual Deck

VIBRATING SCREENS

Extra length, dual deck screening for bigger tonnage production that uses no larger working area than a single screen. Syntron Dual Deck Screens scalp, coarse size and grade in one complete operation.

Compulsory driven, swinging mass type units that do not slow down under sudden load surges—require less power to operate. Are easy to install.

...and for increased mining profits

PULSATING MAGNET SCREENS
For heavy tonnage sizing and scalping.
Replaceable screen surface. Controllable speeds.

ELECTRIC VIBRATORS
Assure a positive free flow of stubborn materials through bins, hoppers or chutes.

TEST SIEVE SHAKERS
High speed, accurate sizing of test samples. Positive control of time and speed.

POWER CONVERSION UNITS
Complete a-c to d-c power conversion, ready to operate in capacities up to 300 kw.

Send for complete catalogue data—Free

SYNTRON COMPANY
166 Lexington Ave. Homer City, Penna.

The *Mokelumne Gold Placers Corporation* has leased 320 acres of virgin ground at Volcano, Amador County, California and is drilling downstream from the old worked portions of the Mokelumne and Cleveland Channels to sample the property at the junction of the two ancient river beds. At the present time, with the high costs of materials and labor, the firm estimates that a profitable operation of the property could be carried out only if gravel carrying in excess of $20.00 per yard in gold could be found in the downstream continuation of these lava capped channels. Ray C. Parks is president of the firm.

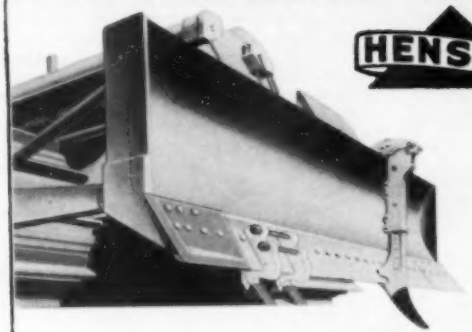
Great Lakes Oil and Chemical Company which purchased the *Kergon* No. 1 through 10 claims in the Miracle Springs area near Bakersfield, California last year, has made its first shipment of uranium ore. The ore was shipped to *Vitro Uranium Company* at Salt Lake City, Utah for processing. At the mine, Great Lakes is doing exploratory work at the bottom level of a 65-foot shaft.

The *Surprise Corporation* has been stockpiling uranium ore at its 50-acre claims near McKittrick, California preparatory to shipping. The firm, headed by George Wolff of San Francisco, was formed to develop the claims, after leasing the property from Les Barker, Kenneth Hitchcock, W. G. Boardman, and Floyd Taylor of Taft. Mining thus far has been open pit using a bulldozer.

J. Paul Bursey, H. T. Tooley and Ted Brown, all of Ventura County, California have signed uranium development con-

WHEN THE GOING IS TOUGH IT'S A PUSHOVER WITH....

HENSLEY



Added life — greater economy from Hensley's special analysis steel Cutting Edges . . . whether you're biting and moving dirt, shale, rocks, gravel or hard-packed snow!

Hensley Cutting Edges are precision punched to fit all kinds of earth-moving equipment, and may be ordered plain or hard-faced to suit your special needs! Contractors are learning they can depend on Hensley Cutting Edges—just as they depend on Hensley dozer rippers, scraper rippers, bottom track rollers, scarifier points and many other items in complete stock at your nearby Hensley dealer!

Write for the name of your nearest **HENSLEY** Dealer

Some Dealer Territories Open

HENSLEY TRADE MARK

EQUIPMENT COMPANY, INC.

800 PERALTA AVENUE • SAN LEANDRO, CALIFORNIA

Since 1908 . . .

DIAMOND DRILL BITS

for exploration and prospecting.

choose the RIGHT MATRIX HARDNESS for YOUR JOB!

- **ASCOLITE** bits . . . 55 to 60* hardness
- **NICOLITE** bits . . . 40 to 45* hardness
- **BRONZOLITE** bits . . . 18 to 24* hardness

*on Rockwell "C" scale

POWDERED METAL

Special tungsten alloy powdered metal matrix to meet all drilling conditions. Bit crowns *sintered* onto blank bits in one operation.

Drill bortz and cast in all sizes and prices.
Brazilian ballas and carbons.
ASCOLITE reaming shells, etc.

Price catalog on request.

EST'D 1908

ANTON Smit & CO. INC.

111 EIGHTH AVE., NEW YORK 11
Cables: PROFITABLE, NEW YORK

STATEMENT OF OWNERSHIP

Statement required by the Act of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946 (Title 39, United States Code, Section 233) showing the ownership, management, and circulation of MINING WORLD published monthly except in April when publication is semi-monthly, at Bristol, Connecticut for October 1, 1955.

1. The names and addresses of the publisher, editor, managing editor, and business managers are: Publisher—Wm. B. Freeman, 121 Second Street, San Francisco 5, California; Editor—George O. Argall, Jr., 121 Second Street, San Francisco 5, California; Managing Editor—None; Business Manager—Max F. Holsinger, 121 Second Street, San Francisco 5, California.

2. The owners are: American Trade Journals, Inc., 121 Second Street, San Francisco 5, California; Miller Freeman Publications, Inc., 121 Second Street, San Francisco 5, California; Wm. B. Freeman, Miller Freeman, Jr., 121 Second Street, San Francisco 5, California; L. K. Smith, W. E. Crosby, 71 Columbia Street, Seattle 4, Washington.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mrotgages, or other securities are: None.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

WM. B. FREEMAN, Publisher

Sworn to and subscribed before me this 27th day of September, 1955.
(SEAL) Barbara M. Hampson, San Francisco, California.
My commission expires February 18, 1958.

MASTER-CRAFTED BY COLUMBIAN SINCE 1893

- *Fast, Easy Erection*
- *Strong*
- *Fire-Safe*
- *Low Upkeep*

All-Metal Buildings *with* Multi-Purpose Uses...

Columbian All-Metal Buildings are all-round favorites with the mining industry because of their versatile utility. Ideal for warehouses, engine houses, dry-houses, shops, garages, pump houses, compressor houses.

Precision fabricated from top quality steel for lasting strength by Columbian's master craftsmen. Sectional construction assures quick, easy, low-cost erection. Exceptionally weather-tight. Rigid, strong, fire-safe. Minimum upkeep.

DISTRIBUTORS

United States — Order from distributors —or write direct for facts.
Denver Equipment Co., 1400 17th St., Denver, Colo.
Eimco Corp., 34 So. 4th West St., Salt Lake City, Utah

Foreign — Avenida Ejercito Nacional 458-D
Colonia Chapultepec Morales, Mexico, D. F.

COLUMBIAN Steel Tank Co. P. O. Box 4048 Kansas City, Mo.

STEEL, Master-Crafted by Columbian ...First for Lasting Strength

tracts with the *Southern Mining and Milling Company* of Phoenix and Atlanta amounting to almost $5,000,000. The men held 47 claims in the Los Padres National Forest area, six miles north of Ojai. Production is expected shortly.

NEVADA

Minerals Engineering Company of Grand Junction, Colorado is exploring for mercury in northern Nevada. A recent strike by a prospector interested J. Fred Johnson, consulting Salt Lake City engineer. He, in turn, interested Blair Burwell, and Minerals Engineering secured an option. Early work disclosed near surface ore assaying to 3.0 percent mercury and 10 feet thick. Minerals Engineering is rushing drills and bulldozers to the area. Meanwhile, arrangements have been made with *Cordero Mining Company* to custom furnace the ore at Cordero's plant at McDermott, Nevada.

Eureka Corporation completed its TL shaft to its planned depth of 1,127 feet on August 11, after two years of intensive prospecting and development work. The TL shaft is a mile northwest of the firm's Fad shaft in the Eureka district of Nevada. The 850 north drift is being extended north to hole No. 106 which shows a 15-foot intersection of excellent ore. Underground work and short drill holes will outline this orebody. Next horizon to be explored will then be the 950 level, where ore is known to occur both to the north and south of the shaft.

Isbell Construction Company has completed a road to the mining property *Homestake Mining Company* recently optioned 32 miles north of Reno, Nevada. Homestake leased the uranium property from the DeLongchamps family. Isbell has now started to drive an adit crosscut to intersect the vein.

United Mercury Corporation, operating about 65 miles southwest of Battle Mountain, Nevada, has completed an extensive development program at its property, including installation of a 100-ton-per-day mercury kiln. Production has started, with mining by open pit.

To equal the fine drilling quality of Liddicoat bits, a drill rod has been developed to provide much greater footage and consequently lower cost per foot of hole drilled. The drill steel has been carburized to provide a stiff rod with a hardened section on the outside of the steel, and on the inside around the water hole. These hardened sections are supported by a strong ductile core.

Carburizing treatment has been designed to correct weaknesses existing in ordinary steel; namely, surface decarburization and low strength zones. By carburizing and hardening, tendency to fatigue failures, rapid wear in drill rods is lessened. The carburized rod incorporates mechanical and metallurgical refinements heretofore unavailable in drill steel.

⅞" Hexagon is the most popular section for feed-leg drilling. To secure the advantages of this cross section of drill steel, the Liddicoat bit is made in type 3 TEE CEE, 3-L and 3-H — all have the same socket size. Within the socket are forged six flats to match the flats on the rod. The bits are all interchangeable, which provides a type of bit best suited to ground conditions.

A trial order will prove the merit of this balanced combination to your entire satisfaction.

Dots in sketches indicate the hardened portions of cross section of drill rod and hardness pattern of Liddicoat bit.

WESTERN
Rock Bit Manufacturing Company
532 West 7th South • Salt Lake City 4, Utah

NEW MEXICO

As a result of improved conditions in the zinc industry, the *New Jersey Zinc Company* has reopened the *Hanover* mine in New Mexico. The mine had been maintained in a standby condition for two years, during which time company engineers had carried out a modernization program. Some of the new facilities are almost completed. A new headframe was erected in the spring and a new shaft is currently being sunk. Additional improvements will include a building to house a hoist room, mine offices, and change house. Shipments of zinc concentrate should soon be moving to the company smelter at Depue, Illinois for production of zinc metal.

United Western Minerals Company, Santa Fe, New Mexico, has received approval for a development program on 650,000 acres of federal and state mineral lands it holds in New Mexico, Colorado, and Utah. Patrick J. Hurley, chairman of the board, and Alva A. Simpson, Jr., president, issued statements to the effect that some of the exploration and development work would be farmed out, and that three firms are now drilling in a 65,000-acre farm-out program in the Grants area. This is the part of New Mexico where the *Jackpile* and other rich uranium finds have been made.

Canoncito Uranium Corporation of Albuquerque, New Mexico has purchased two parcels of uranium-bearing land between Grants and Gallup which it has farmed out to *Calumet & Hecla, Inc.* Canoncito retains a royalty. Last year it made a similar arrangement with C&H when it acquired 18,000 acres in a Navajo Indian Reservation. Development work is still in progress on that land. In the new transaction, C&H will start exploration and development work immediately. Canoncito paid $110,000 for 40 acres northeast of Bluewater, and next to *Holly Uranium Corporation*. Owners of the land were Mr. and Mrs. Edmund D. Davenport. The second parcel of land includes 30,000 acres around the town of Gallup. Canoncito paid *Gallup Coal Company* $1.00 per acre.

PROFESSIONAL DIRECTORY

One-Inch Card, $50 Yearly—½-Inch, $35 Yearly, Payable in Advance.

CONSULTING ENGINEERS:

Philip J. Baukol
DESIGNER OF PLANTS
• INDUSTRIAL • METALLURGICAL •
2101 University Ave. Berkeley 4, Calif.

DICKINSON LABORATORIES
Assayers—Chemists—Metallurgists—Umpires
Shippers Representatives at Local Smelters
Representatives at Mexican Border
Points for Shippers of Manganese and Fluorspar
1300 West Main Street El Paso, Texas

HERBERT BANKS JOHNSON
CONSULTANT
Electrostatic Separation
Process Developments
804 Franklin Street Clearwater, Florida

PHILIP L. JONES
Consultant
Mineral Economics & Mineral Dressing
Heavy Media Specialist
405 Miners Bank Bldg. Tel. MAyfair 3-7161
Joplin, Mo.

C. P. KEEGEL
Mining & Metallurgical Engineer
Administration Appraisal
707 S. 6th St. Tel. 571
Las Vegas, Nevada

ARNOLD H. MILLER
CONSULTING ENGINEER
General Mine, Mill and Industrial Appraisals,
Plant Design, Mechanization.
Cable: "ALMIL" Tel. Cortland 7-0635
120 Broadway New York City 5, N. Y.

MURPHY, F. M.
Consulting Mining Geologist
1201 Maryland Parkway, Las Vegas, Nev.

RODGERS PEALE
Consulting Mining Geologist
315 Montgomery St. San Francisco 4, Calif.

ARTHUR R. STILL
Consulting Mining Geologist
Room 24, Union Block Prescott, Arizona

MARVIN J. UDY
Inorganic Chemistry Electrochemistry
Electric Furnace Smelting
Process Metallurgy
Ferro-Alloys, Calcium Carbide, Phosphorus
546 Portage Road Telephone 2-6294
NIAGARA FALLS, N. Y.

WISSER AND COX
Consulting Geologists
55 New Montgomery St.
San Francisco, California

HARRY J. WOLF
Mining and Consulting Engineer
Examinations—Valuations—Management
One Park Place, New York 7, N. Y.
Cable: MINEWOLF Tel.: REctor 2-8307

CHEMISTS, SAMPLERS, SHIPPERS' REP'S:

ARIZ. TESTING LABORATORIES
CLAUDE E. McLEAN, REGISTERED ASSAYER
Analytical and Consulting Chemists
Box 1888 817 W. Madison St. Phoenix

B. W. DEASON V. E. WORSLEY
BLACK & DEASON
Assayers and Chemists
Ore Shippers Represented at all Smelters
P. O. Box #1888 Salt Lake City, Utah

THE COLORADO ASSAYING CO.
ASSAYERS, CHEMISTS and
SPECTROGRAPHERS
Est. 1900
Gold and Silver $2, Copper $1, Uranium $7.50.
Send for free copy of our Mineralogist Pocket
Reference Giving Detailed Information on all
Principal Ores.
2013 WELTON ST., DENVER 1, COLORADO

T. G. Deggendorfer
Shippers' Representative
Control Assays
Box 840 Kellogg, Idaho

GOODALL BROTHERS
ASSAYERS AND CHEMISTS
SHIPPERS' REPRESENTATIVES
Helena Established 1909 Montana

HANKS, INC., ABBOT A.
ASSAYERS AND CHEMISTS
Supervision of Sampling at Smelters
Spectrographic Analysis
624 Sacramento St. San Francisco 11

HAWLEY & HAWLEY
W. E. HAWLEY, Mgr.
Assayers, Chemists, Ore Buyers
Shippers' Representative
P. O. Box 1060 Douglas, Arizona

SMITH-EMERY COMPANY
Established 1910
Assayers—Chemists
Metallurgists
Spectrographers
Shippers' Representatives
Price List on Request
781 East Washington Blvd., Los Angeles, Calif.

Wood Assaying Co., Henry E.
Established 1878
ASSAYERS and CHEMISTS
733 W. Colfax Denver 4, Colorado

PRODUCTS AND SUPPLIES:

VAN WATERS & ROGERS
Flotation Chemicals, Mining Reagents
Largest and Most Complete Stocks
in Northwest
Seattle, Spokane, Portland, Boise

DRILLING COMPANIES:

DIAMOND DRILL
Contracting Company
S. 18 Stone, Spokane 31, Wash.
- "SUPER PIONEER" hand portable core drills
- "K & S INTERNATIONAL" standard surface drills
- "DIA-HARD" Core Barrels
- And a complete line of "Super Pioneer" and standard diamond drilling accessories.

MOAB DRILLING COMPANY
Diamond Core Drilling Contractors
"Uranium Exploration is our Business"
Albert Hbacek, Jr., General Manager
52 E. Central Street Box 387
Phone 4181 Moab, Utah

B. H. MOTT & SONS, INC.
Diamond Core Drilling Contractors
Air Rotary Shot Drilling
Huntington, W. Va. Birmingham, Ala.
Mfg's Core Drills & Accessories
Grand Junction, Colo.

NEW YORK-ARIZONA DEVELOPMENT CORP.
Diamond Core Drilling
614 Mayer-Heard Building Box 347
Phoenix, Arizona Globe, Arizona
Phone Alpine 2-8614

RAY DRILLING COMPANY, INC.
Mineral Exploration Contractors
343 South State Telephone:
Salt Lake City Elgin 5-9345
Riverton, Wyoming Green River, Utah

THE MARKET PLACE

FLOTATION MACHINES
1—Fagergren type STD single cell
1—No. 7 new Morse "Jetair" single cell
2—4 cell Denver Sub-A #15

FILTERS
2—4' x 2' Morse Drum Filters
2—4' x 8' Eimco Drum Filters
1—6' 2 disc Oliver leaf filter
1—6' 3 disc American leaf filter
1—18" Morse round pattern filter press
1—#12 36 leaf Sweetland filter press

BALL & ROD MILLS
1—4' x 4' Marcy Ball Mill
1—6' x 48" Hardinge Conical Ball Mill
1—8' x 22" Hardinge Conical Pebble Mill
1—3' x 8' Marcy Rod Mill

PORTABLE COMPRESSORS
1—105 CFM Ingersoll-Rand
1—125 CFM Jaeger
1—210 CFM Worthington
1—310 CFM Sullivan
1—310 CFM Gardner-Denver

BATTERY LOCOMOTIVES
1—2½ Ton Mancha
1—3½ Ton Atlas
1—3½ Ton Mancha
1—4 Ton Westinghouse
1—4 Ton Ironton
2—6 Ton General Electric
1—6 Ton Mancha
2—7 Ton General Electric
1—7 Ton Atlas
2—8 Ton Goodman
3—8 Ton Ironton
2—8 Ton General Electric
4—10 Ton Atlas

TROLLEY LOCOMOTIVES
1—4½ Ton Goodman
1—5 Ton Jeffrey
2—8 Ton Goodman
2—8 Ton Goodman
3—10 Ton Jeffrey
1—13 Ton Jeffrey
1—13 Ton Goodman
3—15 Ton Jeffrey

WAGON DRILLS
1—FM-2 Ingersoll-Rand
2—FM-3 Ingersoll-Rand

BLOWERS & MINE DRILLS
4—Jeffrey 1½ H.P. Aerodyne midget blower
3—3-L new Sutorbilt rotary blower
1—6" x 15" Victor-Acme rotary blower
1—7" x 17" Victor-Acme rotary blower
1—7L Sutorbilt rotary blower
1—12-30 Sutorbilt rotary blower
1—16" x 36" Roots #5 rotary blower
1—16" x 48" Roots rotary blower
7—12000 CFM American type HS blower with 12½ H.P. motor
1—7' Jeffrey Aerovane Mine Fan.
1—8H 42" Jeffrey Aerodyne Mine Fan
1—108" Joy La-Del Axial Flow Mine Fan

LOADERS
1—#21 Eimco Mucker
3—5 BU Joy Loaders
1—11BU Joy Loader
1—#60 Conway Mucker

CLASSIFIERS
1—27" x 14'6" Derr Simplex
1—48" x 18' Akins Spiral

MOTOR-GENERATION SETS
1—5 KW Crocker-Wheeler
1—7½ KW Century
1—15 KW General Electric
1—40 KW Imperial
1—75 KW Ridgway
1—750 KW Westinghouse rotary converter

MINE CARS
2—20 Cu. Ft. C.I.W. rocker dump
6—23 Cu. Ft. Truax rocker dump
4—27 Cu. Ft. Koppel rocker dump
6—2 Cu. Yd. Koppel rocker dump
2—2 Cu. Yd. Insley rocker dump
12—84 Cu. Ft. Truax rocker dump
3—26 Cu. Ft. Card side dump
3—5 Cu. Yd. Western side dump
100—62 Cu. Ft. End Dump Coal Cars
1—42" x 96" Card Flat Bed Car

LIGHT & POWER PLANTS
1—1½ KW Delco Light Plant D.C.
1—1½KW U.S. Light Plant A.C.
1—3 KW Delco Light Plant D.C.
1—4 KW Kohler Light Plant A.C.
1—5 KW Marble Card Light Plant D.C.
1—10 KW Westinghouse Light Plant A.C.
2—15 KW Waukesha-Century Diesel Generator
1—30 KW Buda-Century Diesel Generator
1—50 KW Cummins-G.E. Diesel Generator

PUMPS
4—1" Ingersoll-Rand new motor-pumps
90—1½" Deming new centrifugal pumps
5—2" American centrifugal pumps
3—3" Goulds centrifugal pumps
1—4" Aurora centrifugal pumps
2—5" Ingersoll-Rand motor-pumps
1—7" Fairbanks-Morse centrifugal pump
1—10" Swaby centrifugal pump
2—1½" Economy 4 stage centrifugal pumps
1—2" Union 6 stage centrifugal pump
4—2½" Pennsylvania 4 stage centrifugal pumps
1—3" Allis-Chalmers 3 stage centrifugal pump
2—3" United 6 stage centrifugal pumps
1—4" Platt 2 stage centrifugal pump
1—5" Manistee 8 stage centrifugal pump
1—4" Layne & Bowler 10 stage sinking pump
1—3" x 4" Worthington duplex piston pump
1—4" x 6" Fairbanks-Morse duplex piston pump
3—4½" x 10" Gardner-Denver duplex piston pump
1—7" x 12" Worthington duplex piston pump
2—#25 Ingersoll-Rand Air Driven Sump Pumps

MORSE BROS. MACHINERY COMPANY

2900 Brighton Blvd. **Denver 1, Colorado**

FEDERAL PIPE & TANK CO.
—WOOD PIPE and WOOD TANKS—
Factory and Main Office
6851 E. Marginal Way
Seattle 8, Wash.

BUSINESS MEN'S CLEARING HOUSE
601 MIDLAND SAVINGS BUILDING
DENVER, COLORADO
52 years of world-wide placement service for all classes of executive, engineering, operating, etc., mine and mill men
FILE YOUR APPLICATION WITH US

FOR SALE
Hardinge Conical Steel Ball Mill, 6' dia. x 22" long.
Allis Ch. Ball Mill, 6' D x 16' L
Rotary Dryers and Kilns: 3' D x 24', 4'6" D x 40'; 5' D x 30'; 10'6" D x 105'
Bird Continuous Centrifuges, 36" x 50" and 24"
Ing. Rand Centrifugal Pump, #10-ALV, 3000 GPM 200'; UNUSED

PERRY EQUIPMENT CORP.
1429 N. 6th St. Phila. 22, Pa.
STevenson 4-7210

15—200, 300, and 500 KW late type Motor Generator Sets and Rotary Converters, 250/275 V DC, 2300/4000 V AC.
25—6, 8, 10, 13, 15, and 20-ton Trolley Locomotives, all gauges. All completely rebuilt.
Electric Hoists for slope, drift, or shaft mines, from 300 HP to 1000 HP, 2300 V and 440 V motors and controls. Complete specifications on request.

COAL MINE EQUIPMENT SALES COMPANY
Frank J. Wolfe — Sheldon J. Wolfe
306-7 Beasley Building — Phone L.D. 34 — Terre Haute, Indiana

DIESEL ENGINE—200 hp, F. Morse, 4 cyl., 14" x 17", Type Y, 257 RPM. Completely overhauled. Very reasonably priced.
JAW CRUSHER 16" x 10"—Farrel Bacon, overhauled, new Mang. jaws. Extra set of mang. jaws. This is a model 78.
500 CU. FT. AIR COMPRESSOR—"Worthington" port., 4 pneum. ties. Cat. D 13000 diesel. 3 years old.
DIAMOND CORE DRILL—"Longyear Pioneer" complete. Good for ⅞", 1⅛", 2⅛" cores.
DIESEL GENERATOR—50 Kw, Cat. D8800 diesel, 3 ph. 60 cycle, 220/440 volt.

Worth Machinery Company
8712 S. San Pedro Street Los Angeles 3, Calif.

THE MARKET PLACE

ALLISON STEEL MANUFACTURING COMPANY

Mine and Mill Buildings • Mine Rails • Ore Cars • Steel Gallows Frames • Ball Mills • Muck Plates • Crucible Drill Steel

We offer a complete repair service to the Mining Industry. Our new Machine Shop is equipped to handle your work quickly and economically.

Hot Milling of All Types of Detachable Bits

SOUTH 19TH AVENUE
PHOENIX ARIZONA
PHONE ALpine 8-7731

EXPLORATION ENGINEERS

MINING ENGINEERS

We have opportunities for engineers with experience in open pit mining operations, including estimating extent of iron ore deposits and related engineering work such as maintaining pit operational plans, sampling, surveying and the layout of construction projects.

Excellent living conditions and benefits. Mine located in desert area of So. Calif. Send complete resume with salary requirements to Employment Manager,

KAISER STEEL CORP.
P. O. Box 217
FONTANA, CALIF.

POSITIONS OPEN

MANAGER, mine, mill, Canadian	to $14,000
ASST. MINE supts. E.M. (2) fgn.	$550
ASST. MILL SUPT. copper Sot'n fgn.	$1,000
SR. GEOLOGIST, mine, explor.	Lib. Sal.
MINE ENGR. coal exp. writer	to $6,000
MINE ENGR. staff state bureau	to $480
MINE foremen, fgn. (2)	$435-$450
MINE ENGR. open pit exp.	start $540
MINE SHIFT boss, U.S.	$450
JR. MINE ENGRS. fgn. & U.S.	$400-$440
MINE draftsmen (2)	$400-$450
ASST. MILL supt. E. Met. fgn.	to $750
SR. ORE dressing engrs. (2)	to $700
METAL'GIST Sot. research S.W.U.S.	$600-$750
METAL'GIST or Ch. E. corrosion	OPEN
PLANT metal'gist smelting U.S.	$400
MET. & chem. engr. grads.	$375-$425
GEN'L MILL F'man fgn. E. Met.	$450
DESIGNERS, elect. mech. Denver	to $500
DRAFTS. mine, mill, fgn.	$600
DRAFTSMEN, mill, smelter S.W.U.S.	$600-$750
METAL'GISTS (2) mill & kiln exp.	$6-$6.600
METALLURGIST or chem. engr. S.W.	$440
JR. METALGIST, 1-2 yr. exp.	$400
REVERB. & convertor f'man, fgn.	$500
MECH. engr. supt. testing lab. U.S.	$600
INDUST. instrument engr.	OPEN
ENGRS. met. chem. mech.	$378-$700
MECH. project engr. const. perm.	$630
MECH. ENGR. concentrator, U.S.	OPEN
INDUST. engr. large mill	OPEN
MECH. ENGR. designer conveyors	$500
ELECT. ENGR. electronics	$600-$700
MASTER MECH. mine, mill, U.S.	OPEN
MASTER MECH. 35-45, mine, fgn. no fee	$650
CHEM. MECH. elect. engrs.	to $700
CHEMISTS (2) U.S.	$16.67 day
ASSAYERS, fgn. $350; U.S. (2)	OPEN
JR. ACCOUNTANT, mine, fgn.	$400 up
METALLURGICAL accountant U.S.	$500
TEACHERS (2) grades, S. Amer.	$250-$350

GLENN B. WILSON EMPLOYMENT SPECIALISTS
306-310 BOSTON BLDG., 828-17TH ST.
DENVER 2, COLORADO

Grind Your Ore
PROPERLY WITH A SELF-CLASSIFYING
NONSLIMING BALLMILL
We Also Mfg. Other Mining Machinery
WHEELER MFG. CO.
4673 Alger, L. A. 39 CH-51713.

Battery Locos: Mancha & Atlas 1½ ton
Air Slusher: 2-drum GDCo. HKE 2000 lb.
Muckers: Eimco 12-B 18" gauge.
Ball Mill: 6x7 Hendy w/125 hp motor
Ball Mill: 5x4 Straub w/new liners
Rod Mill: 4½x10 ft. w/new liners

PAUL F. SMITH
39 W. Adams St. Phoenix, Arizona

REDUCTION MILLS
#2 Sturtevant Ring Roll Pulverizer.
1 Williams 4 Roll High Slide Pulverizer.
11 ROD MILLS: 30"x54", 4'x14', 4'x9', 5'x10' 5'x14', 6'x12'.
6 Tube Mills: 5'x14', 5'x18', 5'6"x22'.
16 BALL MILLS: 3'x4', 3'x7', 5'x8', 5'x10', 8'x5', 6'x2', 6'x9', 6'x10', 7'x5', 7'x9', & #86.
7 HARDINGE CONICAL BALL MILLS: 6'x14', 6'x22", 6'x36", 8'x18", 8'x22", 8'x36", 10'x48".
14 HAMMERMILLS: No. 2 Allis Chalmers, 20x24 Miller, 24x18 Cedar Rapids, 2033 Cedar Rapids, 5XA Gruendler, 36x24 Jeffrey Type B-2, 36x36 Universal, 36x48 Jeffrey, #4 & #5 Williams Jumbo, 3-42x36 MT 26 Jeffrey Metal Turnings Crushers, 60 GA Williams, 8XT Thor Pennsylvania.

FLOTATION CELLS
12 Type EH Kraut Cells
1-#500 & 1-#750 Denver Unit Cells
8-42"x42"x48" Denver Sand & Cell Units

DRUM FILTERS
8-8'x10', 12'x14' & 11'6" x 18' Oliver
1-12'x10' & 2-14'x18' Dorco Drum

CLASSIFIERS
1-8'x31'x24' Turrett Dorr Bowl
1-4'6"x26"-8"x16' Wemco Bowl
1-3'x24'x12' Wemco Bowl
1-3'x24'-10"x10' Dorr Turrett Bowl
8 x 34 & 8 x 23 Dorr Rake
1-36" x 19'3" Wemco Spiral

THICKENERS
22 Dorr & Wemco 14', 16', 20', 24', 26', 36' 80' & 100' Dia. Steel & Wood Tanks
40'x30'-3 Tray Dorr, 4 Compt.
9-10 x 8, 20 x 12, & 14 x 12 Wemco.

AIR COMPRESSORS—ELECTRIC
18 INGERSOLL RAND PRE-2 2864', 3060', 2200', 1568', 302' 1092, & 676', 2300 & 440 V.

TUNNEL MUCKERS
17 EIMCO 102, 40, 21 & 12-B

TUGGER & SLUSHER ELEC. HOISTS
22-2 & 3 DRUM 10, 15, 25, 50 & 60 H.P.

AIR TUNNEL LOCOMOTIVES
2 Model 401 EIMCO NEW 1954

DARIEN, 60 E. 42nd St., N. Y. 17, N. Y.

CLASSIFIED SECTION

8 pt. type 15c per word. 10 pt. type 20c per word. Minimum charge $5.00.

(For Box numbers addressed to Mining World, add $1.00)

Boxed ads (display) in either Market Place or Classified Sections—$8.50 per column inch.
(See Market Place Section for lower contract rates).

Closing Date: If proof required, 1st of preceding month, otherwise 10th.

FOR SALE: 75 ton operating gravity mill. Flowsheet: feeding, crushing, conveying, screening, grinding, classification, tabling, middlings regrind, concentrate drying, roasting, magnetic upgrading, tails dewatering. 125 KVA diesel electric plant, individual motor drives. Also complete mining equipment and camp facilities. This offer subject to prior commitments. Sale due to exhaustion of ore reserves. Located in NW Arizona. Reply Box L-4, Mining World, 121 Second Street, San Francisco 5, California.

FOR SALE

Large group of developed lead-silver mining property. Open for inspection.

119 South Knox St. Denver, Colo.

Market Place Advertising

360 inches	$6.50
180 inches	$7.00
90 inches	$7.50
45 inches	$8.00
Less than 45 inches	$8.50

Contract rates based on local number of column inches used within one year.
30 column inches equal one page.
Closing date: 1st of month preceding publication.
(Used and reconditioned equipment, liquidations, property sales only)
For additional 10,000 WORLD MINING export distribution: Add 50%

INDEX OF ADVERTISERS IN MINING WORLD

Agence Miniere & Maritime S. A. 76
Allen-Sherman-Hoff Pump Co., The .. Inside Front Cover
Allis-Chalmers Mfg. Co., Gen. Machy. Div. ... WM 20 (World Mining Only)
Allis-Chalmers Mfg. Co., Tractor Div. 33-37
Allison Steel & Mfg. Co. ... 97
Alloy Steel & Metals Co. ... 3
American Cyanamid Co. 17
American Manganese Steel Div. 22
American Smelting & Refining Co. 80
American Zinc, Lead & Smelting Co. 66
Arizona Testing Laboratories 95
Atlas Diesel Co. ..... WM 23 (World Mining Only)

Baukol, Philip J. 95
Black & Deason 95
Boyles Bros. Drilling Co. ... 42
Bunker Hill & Sullivan Mng. & Conc. Co. 82
Business Men's Clearing House 96

Caterpillar Tractor Co. 1, 28, 29
Cleveland Div., Westinghouse Air Brake Co. 19
Coal Mine Equipment Sales Co. 96
Coast Mfg. Co. 42
Colorado Assaying Co. 95
Colorado Fuel & Iron Corp. 26
Colorado Iron Works, Sub. of Mine & Smelter Supply Co. 10
Columbian Steel Tank Co. .. 93
Consolidated Pneumatic Tool Co. ..... WM 24 (World Mining Only)
Cummins Diesel Export Corporation ..... WM 12, 13 (World Mining Only)
Cummins Engine Co. ... 12, 13

Darion Corp. 97
Deggendorfer, T. G. 95
Deister Concentrator Co. 77
Denver Equipment Co. 5
Diamond Drill Contracting Co. 95
Dickinson Laboratories 95
Dorr-Oliver, Inc. 7
Dow Chemical Co. 15
duPont de Nemours & Co., Inc., E. I. 60

Elmco Corp. ..... 16, Outside Front Cover (World Mining Only)
Engineers Syndicate, Inc. ... 88
Euclid Div., General Motors Corp. 2

Federal Pipe & Tank Co. 96

Gallagher Co. 24
Gardner-Denver Co. 11
General Electric, International ..... WM 26 (World Mining Only)
Godsey & Co., Inc., E. A. ... 77
Goodall Brothers 95
Goodman Mfg. Co. ..... WM 21 (World Mining Only)

Hanks, Inc., Abbot A. 95
Hardinge Co. 75
Hawley & Hawley 95
Hensley Equipment Co., Inc. 93
Hycon Aerial Surveys, Inc. .. 62

International Smelting & Refining Co. 82
Isbell Construction Co. 90

Jeffrey Mfg. Co. 6
Johnson, Herbert B. 95
Jones, Philip L. 95

Kaiser Steel Corp. 97
Koegel, C. P. 95

Lake Shore Engineering Co. .. 71
Loschen Wire Rope Div., H. K. Porter Company, Inc. 38
LeTourneau-Westinghouse Co. 8, 9, 20
Link-Belt Co. .. Inside Front Cover (World Mining Only)
Longyear Co., E. J. Inside Back Cover

Magma Copper Co. 66
Meissner Engineers, Inc., John F. 76
Merrick Scale Mfg. Co. 84
Miller, Arnold H. 95
Mine Safety Appliances Co. .. 14
Mine & Smelter Supply Co. .. 10
Moab Drilling Co. 93
Morse Bros. Machinery Co. .. 96
Mott & Sons, Inc., B. H. 95
Murphy, F. M. 95

Naylor Pipe Co. 86
New York-Arizona Development Corp. 95
Newmont Mining Corp. 84
Nordberg Mfg. Co. 30, 31

Oliver Corp. ..... WM 71 (World Mining Only)

Pacific Foundry Co., Ltd. ... 66
Peale, Rodgers 95
Perry Equipment Corp. 96
Pittsburgh Lectromelt Furnace Corp. 4

Quaker Rubber Co. 40

Radiac Co., Inc. 74
Ray Drilling Co., Inc. 95
Resisto-Loy Co., The 80

Sanford Day Iron Works 25
Sauerman Bros., Inc. 77
Sheffield Steel Corp. ... WM 25 (World Mining Only)
Simplex Wire & Cable Co. .. 21
Smit & Co., Inc., Anton 93
Smith-Emery Co. 95
Smith, Paul F. 97
Standard Oil Co. of Calif. .. 59
Standard Steel Corp. 32
Stearns, Roger Mfg. Co. 89
Still, Arthur R. 95
Steody Co. 64
Syntron Co. 92

Thomas Flexible Coupling Co. 70
Thor Power Tool Co. ... WM 66 (World Mining Only)
Timken Roller Bearing Co. .. 27
Traylor Eng. & Mfg. Co. 18

Udy, Marvin J. 95
Ultra Violet Products, Inc. .. 88
Union Oil Co. 23

Van Waters & Rodgers, Inc. 95

WedgeWire Corp. 90
Western Machinery Co. .. 72, 73
Western Rock Bit Mfg. Co. .. 94
Wheeler Mfg. Co. 97
Wild Heerbrugg Instruments, Inc. 85
Wilfley & Sons, Inc., A. R. Outside Back Cover
Wilson, Glenn B. 97
Wisser & Cox 95
Wolf, Harry J. 95
Wood Assaying Co., Henry E. 95
Worth Machinery Co. 96

CLAIMS WANTED: Attention small prospects and claim owners who lack adequate funds for exploration and development. We have a program which will interest you. We want our diamond drills operating 100% of the time and can afford to drill on a royalty basis. For full particulars write to Box L-1, Mining World, 121 Second Street, San Francisco 5, California.

URANIUM MINING CLAIMS, booming Utah area, in rich section. High assay value. 20 claims. 350 acres. Drill sites. Easily accessible. Only $12,000 handles. Dept. #22494 for full information.

FREE BULLETINS ON ABOVE BUSINESS

Chas. Ford & Assoc.

6425 Holywood Blvd., Los Angeles, Calif.

CHIEF GEOLOGIST—MINERALS — Potential Vice President, 15 to 25 years experience in field exploration and mine examination. Must be competent negotiator; have ability to handle people and substantial experience in economic analysis and evaluation. Excellent opportunity to take charge of exploration department for successful domestic mining company and become member of management team. Oil and gas geological experience also desirable. Salary open. Send detailed resume. Confidential. Reply to Box L-2, Mining World, 121 Second Street, San Francisco, California.

FOR SALE: Marvelous copper prospect. Assuring large copper production with smallish outlay of capital. Price-terms reasonable. Report-map available. Address: Engineer, Bumble Bee, Arizona.

OPENINGS AVAILABLE AT LONG ESTABLISHED MEDITERRANEAN COPPER PROPERTY

ASSISTANT CONCENTRATOR SUPERINTENDENT

Age limit about 45. Must be graduate metallurgist having operating experience and with aptitude and experience in laboratory research and process development. Heavy sulphide ore experience desirable. Qualified to succeed to superintendency.

ASSISTANT MINE SUPERINTENDENT

For long established copper project in Mediterranean. Requires man with excellent broad mining engineering training. Some operating experience necessary. Age 30-42 must be tactful and adaptable. Forward with initial reply complete educational and experience record, list of references, age, marital status, number and age of children, photo (optional). Company offers three year contract, furnished house, transportation self and family, liberal vacations. Excellent climate, living conditions, medical and hospital facilities, school to 14 years. Non-contributory pension plan. Salary open.

ASSISTANT CHIEF ENGINEER

Age limit 45 preferably about 35. Must be graduate mechanical, chemical or civil engineer with natural mechanical ability, excellent practical and supervisory and some construction experience, for charge under Chief Engineer of all shops, foundry, mobile equipment including loading, marine, railway and construction; maintenance and repair of all types of equipment; 7250 KVA diesel generating plant.

Reply to Box E-3, Mining World, 121 Second Street, San Francisco 5, California.

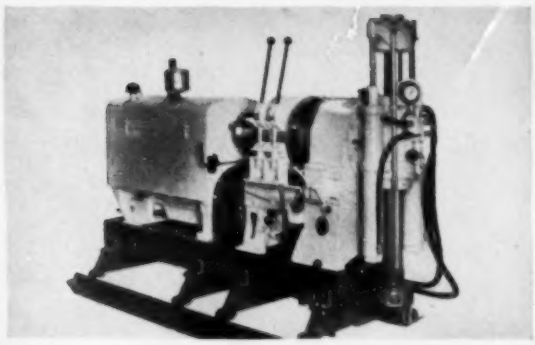
Applications are invited for the position of Assistant Mill Superintendent at a large base metal mine in South West Africa. Applicant should be a technical graduate and must have had at least five years base metal flotation experience. Company offers three year contract, transportation for self and family, and salary while traveling. House furnished with heavy furniture available for married man. Climate and living conditions excellent. Forward reply, giving age, education, experience record, references and marital status to Box K-3, Mining World, 121 Second Street, San Francisco 5, California.

POSITION OPEN: Permanent position open for assistant Maintenance Superintendent to assist supervision of all maintenance work in mine, mill, sinter plant and village of a large northeastern New York mining operation. Salary range $6,000 to $7,000 plus attractive salary benefits. Minimum 5 years experience required in supervision of mechanical and electrical maintenance work. Mechanical or electrical engineer preferable. Submit resume of experience, education and personal data to Box L-3, Mining World, 121 Second Street, San Francisco 5, Calif.

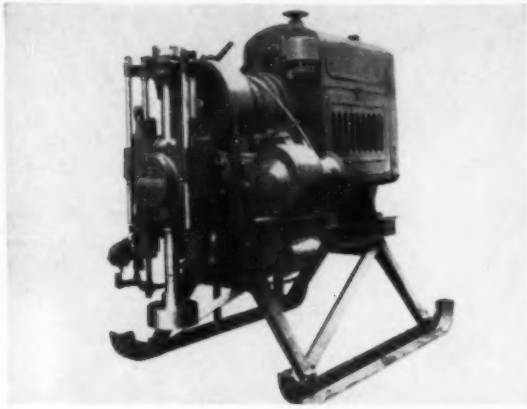
POSITION OPEN: Applications are invited for the position of Assistant Mine Superintendent at a large base metal mine in South West Africa. Applicant should be a technical graduate and must have had at least five years varied mining experience in base metal mines. Company offers three-year contract, transportation for self and family, and salary while traveling. House furnished with heavy furniture available for married man. Climate and living conditions excellent. Forward reply, giving age, education, experience record, references and marital status to Box L-5, Mining World, 121 Second Street, San Francisco 5, California.

Longyear

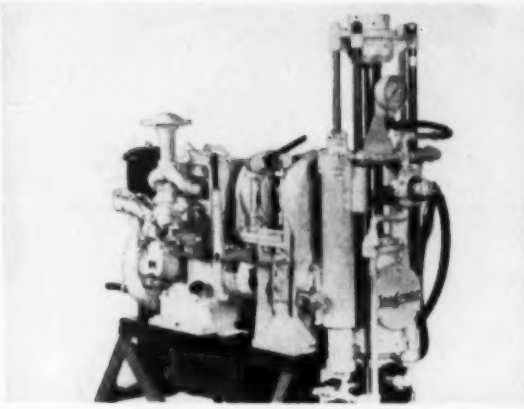
A Longyear core drill for every job



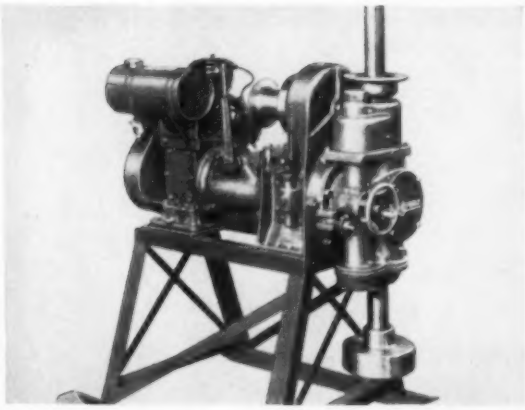
The "44" heavy duty drill
capacity 4000 feet of AW rod



Junior Straitline
capacity 1350 feet of EW rod



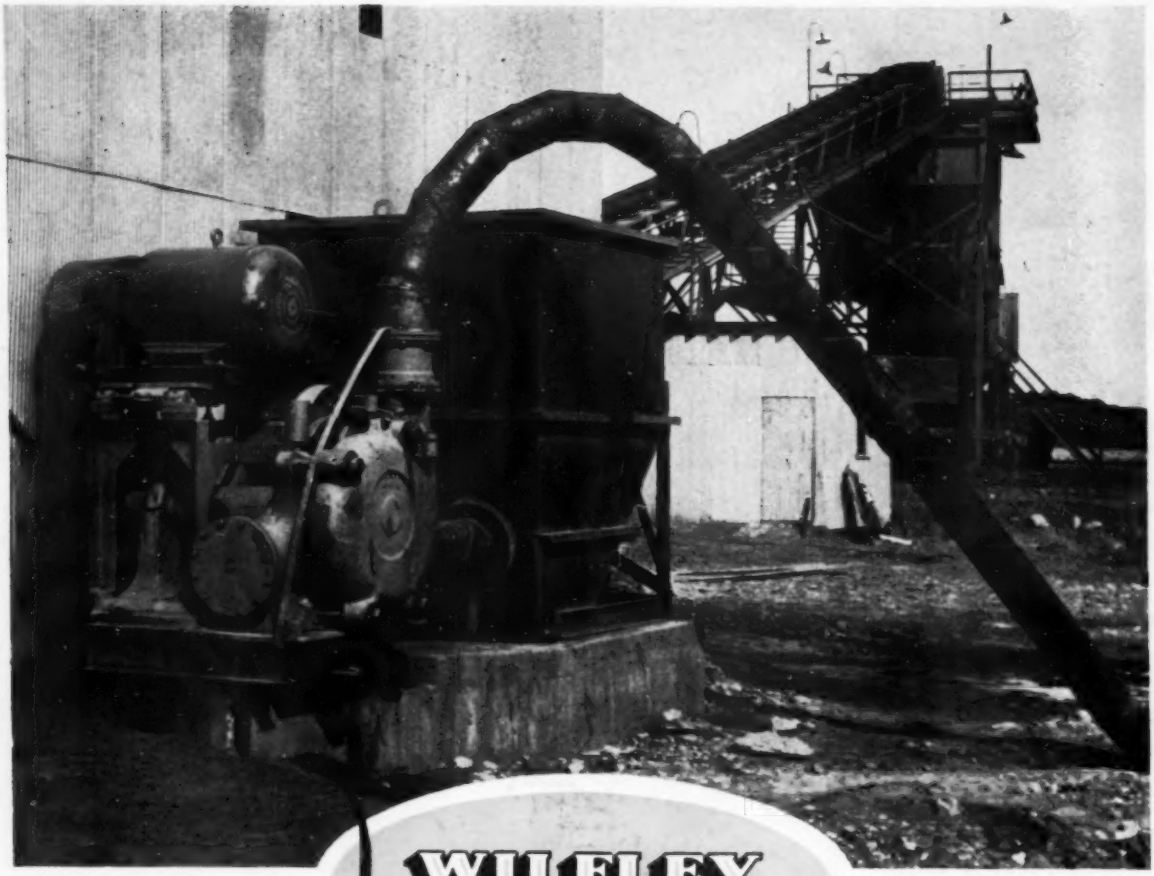
The "24" drill
capacity 750 feet of EW rod



The Prospector
capacity 325 feet of EW rod

The Porta
capacity 200 feet of XRT rod

E. J. Longyear Co. MINNEAPOLIS, MINN. · CABLE LONGCO



WILFLEY SAND PUMPS

CONTINUOUS TROUBLE-FREE ECONOMICAL

operation without attention

The Wilfley Sand Pump shown here, handling waste materials, is typical of the many Wilfley installations that contribute greatly to the efficient, economical production of iron ore. Wilfley users throughout the iron ore industry know the name Wilfley means cost-saving performance on every pumping job. Individual engineering on every application.

Wilfley Acid Pump
"COMPANIONS IN ECONOMICAL OPERATION"
Wilfley Sand Pump

Write or wire for complete details

A. R. WILFLEY and SONS, INC. Denver, Colorado, U.S.A.
New York Office: 1775 Broadway, New York City